DRAFT

Great Falls South Arterial

Alignment Study

2008

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Disclaimer

This study is part of a long- term planning process that carries forward recommendations from a recently completed Arterial Feasibility Study and the current Great Falls Transportation Plan, both of which recommend further study of the South Arterial. The planning-level analysis, being conducted under this study, allows for the identification, selection and elimination of potential alignments, but lacks the precision to identify the specific properties or other features impacted. After the currently proposed alignments are reduced to one or more alignments, additional detailed and specific environmental analysis and design will then be conducted, including the identification of specifically impacted properties and possible mitigation measures. The reader should also be advised that even after completion of these types of environmental analyses, major roadway improvement projects can typically take from seven to ten years to reach the construction phase. This project development process is also highly dependent on funding availability, which can add to the timeline.

Abstract

The *Great Falls South Arterial Alignment Study* analyzes a wide array of data and identifies one alignment as the recommended alignment within a broad corridor located along the southern edge of the Great Falls urbanized area. The concept of connecting I-15 with US 87/89 through a southern corridor was documented in the *2004 Great Falls Arterial Feasibility Study*.

The following purpose statement is derived from this *South Arterial Alignment Study*: ***The purpose of the proposed project is to reduce congestion and improve safety on the 10th Avenue South corridor, improve street network mobility, and provide an additional Missouri River bridge crossing, south of 10th Avenue South.***

The project management team, consisting of representatives from the City of Great Falls, Cascade County, Montana Department of Transportation, and Federal Highway Administration refined thousands of alignments, produced by a specialized route optimization software, into six optimized alignments. These alignments were screened utilizing selected analysis criteria and the alignment with the fewest overall impacts and lowest cost was identified as the recommended alignment. If the project advances beyond this study, the recommended alignment will need to be reviewed under a National Environmental Policy Act/Montana Environmental Policy Act (NEPA/MEPA) process to ensure that the proposed roadway design would minimize impacts to the surrounding and natural environments.

Federal regulations allow large projects, such as the South Arterial, to be divided into smaller independent segments, but each segment must have independent utility and logical termini. Given the substantial project costs a phased approach to construction is necessary. This study identifies an independent segment, which would meet federal regulations, as well as a complete recommended alignment.

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EXECUTIVE SUMMARY

A. BACKGROUND

A southern arterial link between I-15 and US 87/89 has been under consideration by Great Falls and Cascade County officials, as well as other local public and private entities, for many years. In 1994, a local working group was assembled to support development of the arterial. The working group prepared a "Strategy Plan" which identified steps to make the arterial a reality. An initial step was to incorporate the arterial into the *2000 Great Falls Area Transportation Plan* for further study. In 2004, a *Great Falls Arterial Feasibility Study* evaluated northern and southern arterial corridors. The study found that the southern arterial was feasible, in that it would provide a variety of benefits to the transportation system. Under the 2005 Federal Transportation Bill (SAFETEA-LU), Great Falls and Cascade County received a $4.5 million earmark to conduct a location study and environmental analysis for the South Arterial.

B. PURPOSE OF THE STUDY

This Alignment Study builds on analysis from the *Feasibility Study*. It provides an examination of the opportunities and constraints in the study area (Figure A) and includes cost estimates of proposed alignments. This study identifies a recommended alignment, which, if projects are forwarded with federal and state funding, will need to be reviewed under a future National Environmental Policy Act/Montana Environmental Policy Act (NEPA/MEPA) process to ensure that the proposed roadway design would minimize impacts to the surrounding built and natural environments.

The primary purposes of this study are to:

- Confirm the goals and objectives and develop a purpose and need statement for the South Arterial;
- Select a single or limited number of alignments for an arterial along the south edge of Great Falls;
- Identify sections with independent utility along the selected alignment;
- Identify the approximate recommended footprint for future build-out of the alignment including; access points, lane configuration, and design speed; and
- Identify areas along the alignment that may require mitigation due to impacts.

C. METHODOLOGY AND FRAMEWORK

The study was advanced through the Great Falls Metropolitan Planning Organization (MPO) which includes representatives from the City of Great Falls, Cascade County, Great Falls Transit District, Montana Department of Transportation (MDT), and Federal Highway Administration (FHWA). A project management team with representatives from these agencies developed the study for review and acceptance through the MPO.

Insert Figure A – Study Area Opportunities and Constraints

Key elements of the study included:

- Involvement of the public, resource agencies, local governments and community leaders.
- An environmental scan that considered the geographic setting for physical, biological, and cultural resources to identify opportunities and constraints within the study area.
- An alignment analysis utilizing a route optimization tool called Quantm that considered engineering design standards as well as built and natural constraints in the area to develop and screen new roadway alignment options. The system simultaneously weighed factors such as impacts to homes and businesses, historic and cultural sites, and wetlands, as well as construction costs associated with topography and earthwork, structures, and paving to identify optimal alignments for the South Arterial.
- Analysis of travel demand for a South Arterial utilizing the travel demand model developed for the *2003 Great Falls Area Transportation Plan* and based on land use assumptions developed as part of that plan. Forecasts were generated for the 2035 study horizon year.
- Development of a purpose and need statement for the South Arterial.
- Financial analysis considering currently available funding sources and potential future federal, state, and local funding sources.

D. KEY FINDINGS

Purpose and Need

The purpose and need identified in this study are consistent with the goals, objectives, and policies set forth in the local growth policy and transportation plan. It will be used as part of the overall project development process consistent with NEPA/MEPA.

Based on the information contained in previous studies and plans and information gathered from the public and stakeholders, the following purpose statement was derived from the South Arterial Alignment Study: ***The purpose of the proposed project is to reduce congestion and improve safety on the 10th Avenue South corridor, improve street network mobility, and provide an additional Missouri River bridge crossing, south of 10th Avenue South.***

Additional benefits expected if the entire arterial is developed include:

- Improving air quality by reducing congestion and stopping and idling times;
- Improving an international and regional trade corridor and reducing travel time between the area's two military operations; and,
- Reducing emergency response times to and from the southwest Great Falls area and providing an additional emergency egress in case of disaster.

Alignment Analysis

After a beginning and end point were specified near the Gore Hill Interchange on the west end and 57th Street South on the east, thousands of alignments were generated through a defined corridor which was consistent with the corridor identified in the *2004 Great Falls Arterial Feasibility Study*. The 50 lowest cost alignments were then color coded and presented in a "spaghetti map" (Figure B).

The project management team refined the Quantm produced alignments into five possible alignments. In addition, one other alignment (the Purple Alignment, Figure C) was added based

on resource agency input as an option that would totally avoid the Great Falls Portage National Historic Landmark, a Section 4(f)[1] property. Prior to approving a project that uses Section 4(f) property, FHWA must find that there is no prudent or feasible alternative that completely avoids 4(f) resources.

These six alignments were carried forward for review under this planning-level analysis. Four areas of concern under NEPA/MEPA were considered, including Section 4(f) properties, wetlands, floodplains, and rights-of-way (this includes both private-land impacts and possible relocations) as summarized in Table A. Cost was also an analysis factor. This analysis was based on a four-lane, rural principal arterial with limited access control, turning lanes at access points, and a general design speed of 60 mph. In addition, travel forecasts for the 2035 horizon year were generated using the Great Falls area travel demand model. Based on future travel demand, traffic volumes in the range of 10,000 to 17,000 vehicles per day (vpd) between I-15 and 13th Street South demonstrate the need for a four-lane. However, east a two-lane would be adequate to accommodate the projected 7,000 to 8,000 vpd east of 13th Street South with right-of-way preserved for an eventual four-lane.

Table A. Alignment Analysis Summary

Range	4(f) Acres Impacted 0-63 Acres	Wetland Acres Impacted 9-16 Acres	Floodplain Acres Impacted 46-91 Acres	Parcels with Structures 26-56 Parcels	RW Acres Impacted 214-282 Acres	Cost (in millions) $275-$540
Purple	*	▲▲	▲▲	▲▲	▲▲	▲▲
Aqua	►	▲▲	►	▲▲	►	▲▲
Blue	►	▲▲	►	▲▲	▲▲	▲▲
Green	▲▲	▲▲	▼	▼	▼	►
Red	▼	▲▲	►	►	►	▼
Yellow	▲▲	▼	▲▲	►	►	▲▲

* No Impacts

▼ Least Impactive

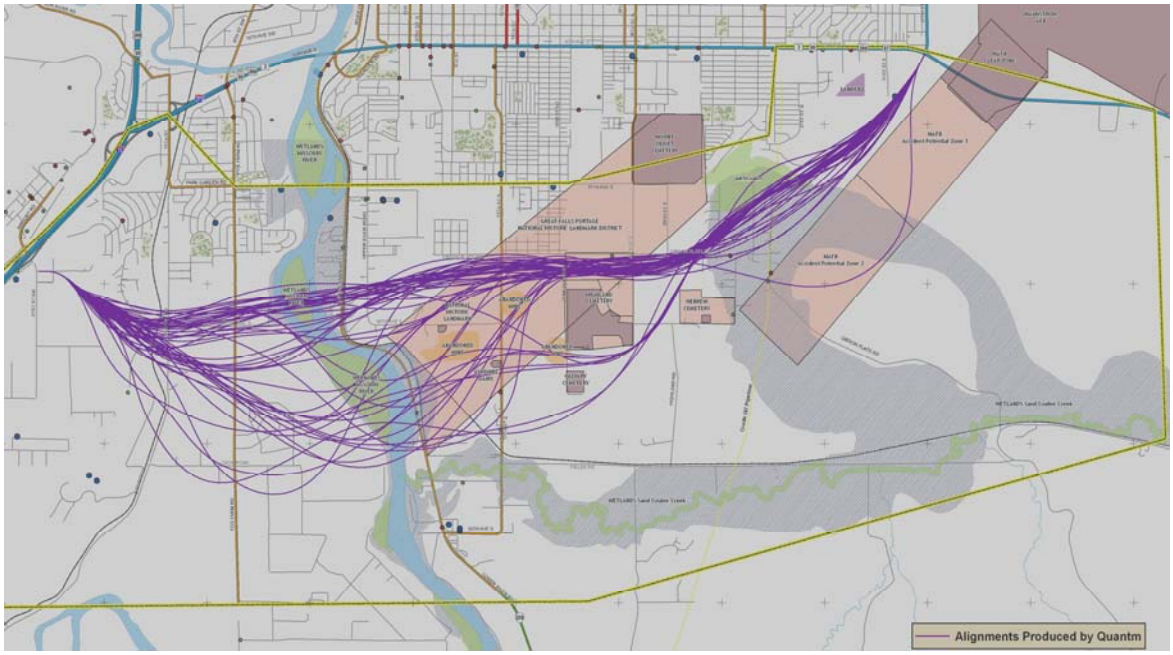
► Impacts within 20% of least impactive alignment if impact is <100, within 10% if impact is >100

▲▲ Greatest Impact - beyond 20% of least impactive alignment if impact is <100, beyond 10% if impact is >100

[1] Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 USC 303) protects the use of land from a significant public owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless the following determinations are made: 1. There is no feasible and prudent alternative to the use of land from the property; and 2. The action includes all possible planning to minimize harm to the property resulting from such use.

Figure B – Range of Alignment Options

Range of Alignment Options



Insert Figure C – Analyzed Alignment Options

Although the Purple Alignment avoids the use of 4(f) resources, the alignment was rejected based on adverse impacts to property and floodplains, extraordinary cost, and inability to meet purpose and need. Compared to the other five alignments, the Purple Alignment:

- Impacts nearly twice as many floodplain acres,
- Impacts 17-30% more right-of-way acres,
- Impacts nearly twice as many parcels with structures,
- Costs 70-95% more,
- Generates 50-60% less travel demand between Fox Farm Road and US 87/89 due to its long length with 50% less traffic relief on other key network links[2], and
- Impacts the viewshed south from the National Historic Landmark.

It is not considered prudent to carry the Purple Alignment forward based on purpose and need along with significantly more impacts to developed parcels, floodplains, right-of-way acquisition, and costs.

Of the remaining five alignments, impacts are similar except that the Red Alignment is the least impactive to 4(f) properties and the least costly. Although the Green Alignment appears to have similar impacts as the Red Alignment, it impacts over 40% more acres of the National Historic Landmark than the Red Alignment. In addition, the majority of citizens who responded to a survey regarding the five alignments (distributed at the second public meeting) selected the Red Alignment as the most preferred. Based on this analysis, the Red Alignment is advanced as the ***recommended alignment*** for consideration in the formal NEPA/MEPA level environmental review process**.**

Estimated Cost[3]

Based on most recently available unit costs, the full arterial (Red Alignment) is estimated to cost $208,000,000 for a two-lane roadway to $285,000,000 for a four-lane roadway in 2035. A partial arterial, from Fox Farm Road to 13TH Street South that generated traffic volumes of 10,000 to 13,000 vehicles per day (vpd) and reduced volumes on both 10th Avenue South and Fox Farm Road demonstrating independent utility, is estimated to cost from $83,000,000 to $93,000,000 for a four-lane roadway. This is a 2017 cost estimate.

The ability of this project to be funded for continued development, including final design, right-of-way acquisition, and construction is a function of the availability of existing and future federal, state, local, and private funding sources. Due to the tremendous costs anticipated for right-of-way acquisition and construction of a South Arterial, the project is generally considered to be beyond the ability of the participating agencies to fund it through existing funding avenues. As such, special congressional appropriations, coupled with funds from the State of Montana, Cascade County the City of Great Falls, and private development are anticipated to be the best means to further develop the project. In addition it is critical that local governments take actions within their jurisdictions to preserve the corridor for the future build-out of the South Arterial.

[2] Travel demand for the Purple Alignment, which completely avoids 4(f) resources, was up to 7,000 vehicles per day (vpd) between Fox Farm Road and US 87/89 with limited traffic relief to 10th Avenue South and other network links, compared to approximately 18,000 vpd for the five alignments that enter the National Historic Landmark and do demonstrate beneficial reductions in traffic and improved level-of-service on the 10th Avenue South corridor and other network links. Travel demand between I-15 and Fox Farm Road is generally the same for all alignments at 9,000 to 11,000 vpd.

[3] Estimated cost includes inflationary factors and indirect costs. The full arterial is for year 2035, using Global Insights Project Cost Inflation Calculator and a 3% annual inflation rate and the partial arterial is for year 2017 for all phases but PE which is 2012 using Global Insights Project Cost Inflation Calculator.

E. CONCLUSION AND NEXT STEPS

The *2004 Great Falls Arterial Feasibility Study* recommended a four-lane arterial serve as the basis for future studies. Both two-lane and four-lane arterial configurations were examined during this Alignment Study. As a result of this analysis the study proposes the Red Alignment (Figure D) as the recommended alignment and that it be designed as a limited access, undivided four-lane rural principal arterial with limited access control, a paved median, at-grade intersections including turn lanes and a 60 mile per hour design speed. As this project moves forward these recommendations may be adjusted to further reduce impacts. The arterial should have direct access from:

- Fox Farm Road
- Upper River Road
- 13th Street South, and
- 26th Street South

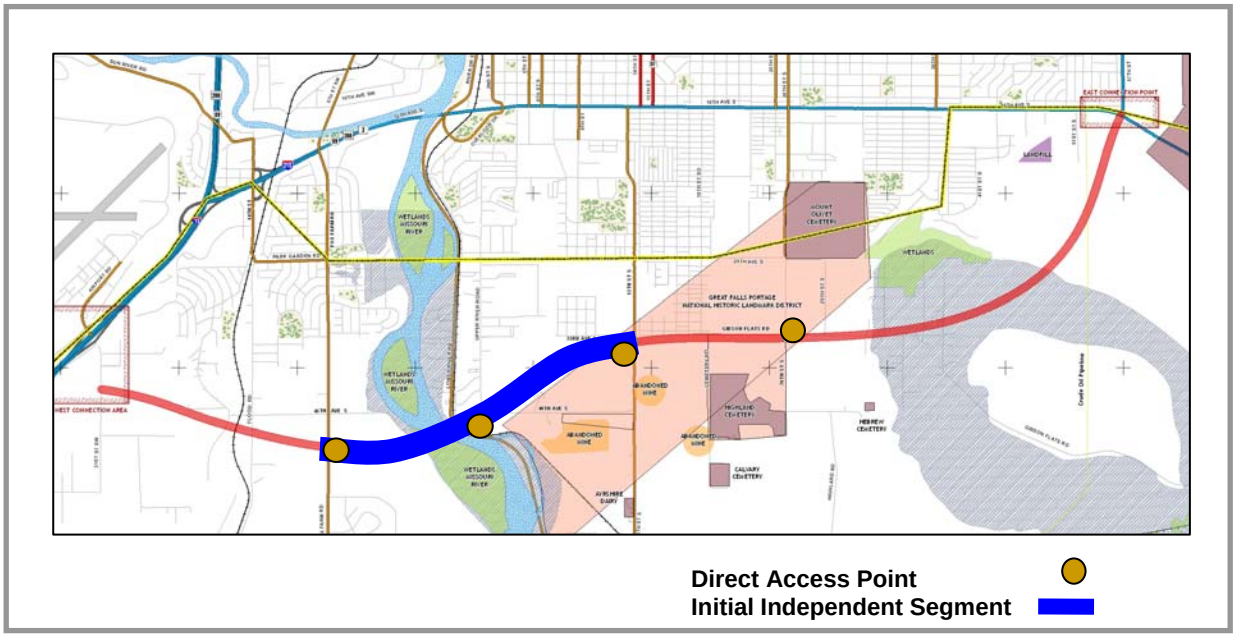
At 13th Street South, the arterial would follow the existing 33rd Avenue South/Gibson Flats Road to 26th Street South. From 33rd Avenue South/Gibson Flats Road, the arterial would continue northeast to its termination at 10th Avenue South (US 87/89). Endpoints would be at I-15, near the Gore Hill Interchange, and at 10th Avenue South (US 87/89), near 57th Street South.

Given federal planning requirements and the high project costs, the ability to advance the South Arterial will be highly dependent on successfully financing and constructing independent segments of the arterial, as reasonably available funding sources are secured.

If the Fox Farm Road to 13th Street South segment was pursued as the initial independent segment, the estimated cost in 2017 would be:

Preliminary Engineering	$ 5,000,000
Right-of-Way	$14,000,000 to $17,000,000
Incidental Construction	$ 10,000,000
Construction	$51,000,000 to $58,000,000
Construction Engineering	$ 3,000,000
TOTAL	$83,000,000 to $93,000,000

Figure D – Recommended Alignment and Segment of Independent Utility



Considering the amount of currently available funding (approximately $4,900,000 of the SAFETEA-LU earmark, plus state match), there are sufficient funds for development of an environmental document, which is part of the Preliminary Engineering phase. However, to achieve federal approval of the environmental document and ensure continued development of the South Arterial, it is critical that the participating agencies continue to work together to secure the remainder of the financing package by conducting the two following steps[4]:

1) Demonstrate reasonably available revenues to cover the estimated cost of the initial independent segment from Fox Farm Road to 13th Street South and reflect funding for this segment in the update of the *2003 Great Falls Area Transportation Plan;* and,
2) Identify available funding for a subsequent phase (i.e., final design[5]) and update the MPO Transportation Improvement Program (TIP) and MDT Statewide Transportation Improvement Program (STIP) to include funding for this project phase.

Until these steps are accomplished, the NEPA/MEPA compliant environmental review should not be advanced.

Additional critical steps in the financing package are:

1) Update of the *2003 Great Falls Area Transportation Plan* - This plan update should include improvements as needed to other network links that would experience increased pressure with construction of the full arterial or partial arterial (i.e. 13th Street South, Upper River Road, 33rd Avenue/Gibson Flat Road, Flood Road, etc). In addition to item one above:
2) Local governments should take appropriate steps, to the extent allowed by local land use policies and regulations, to preserve the recommended South Arterial corridor as lands are developed and as other opportunities arise.

[4] These steps are necessary if the environmental document identifies a preferred alternative other than the "No-Build".

[5] Currently, project phases are as follows: Preliminary Engineering (PE), Right-of-Way (RW), Incidental Construction (IC), Construction (CN), and Construction Engineering (CE). Recognizing "final design" as a project phase would require an MDT business process change allowing a two-tier approach to PE. The first tier would be the NEPA/MEPA process and formal definition of the project and the second tier would be final design.

1. INTRODUCTION

The concept of a new arterial along the southern edge of Great Falls was first proposed in the late 1960s. It has been the subject of several planning studies. The current concept, connecting I-15 with US 87/89 (Montana Highway 3), has been most recently documented in the *2003 Great Falls Area Transportation Plan* and the *2004 Great Falls Arterial Feasibility Study*. These documents were developed through the federally required Great Falls Metropolitan Planning (MPO) Process by the former Great Falls City-County Planning Board (now the Great Falls Planning Advisory Board). The arterial has received broad-based support from the following:

- City of Great Falls
- Cascade County
- Great Falls Area Chamber of Commerce
- Great Falls Development Authority
- Montana Department of Transportation (MDT)
- Great Falls International Airport Authority

This *Great Falls South Arterial Alignment Study* is also being advanced through the Great Falls Metropolitan Planning Organization (MPO). A project management team consisting of representatives from the City of Great Falls, Cascade County, MDT, and Federal Highway Administration (FHWA) conducted the study. The consulting firm of HKM Engineering was hired by MDT to facilitate public involvement activities and to coordinate resource agency involvement in the study.

1.1. Study Purpose

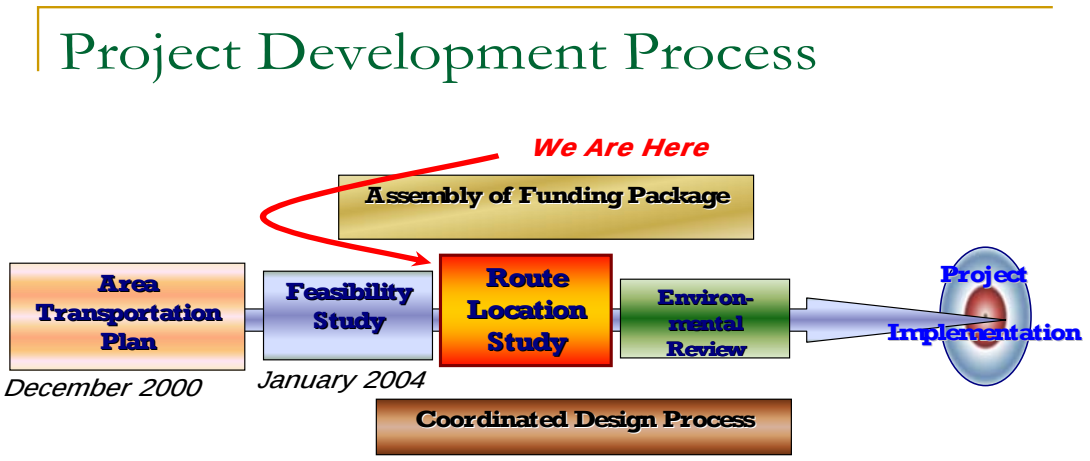
The primary purposes of this study are to:

- Confirm goals and objectives and develop a purpose and need statement for the South Arterial;
- Select a single or limited number of alignments for an arterial along the south edge of Great Falls;
- Identify sections with independent utility along the selected alignment;
- Identify the appropriate recommended footprint for future build-out of the alignment, including access points, lane configuration, and design speed; and,
- Identify areas along the alignment that may require mitigation due to impacts.

The selected alignment, or independent segment may advance through a formal environmental review governed by the National Environmental Policy Act / Montana Environmental Policy Act (NEPA/MEPA) process based on federal funding availability. The intent of the study was to minimize cost, identify environmentally, culturally, and socially sensitive areas, weigh engineering needs, and consider both public and resource agency input.

This study further builds on the analysis conducted in the *2004 Great Falls Arterial Feasibility Study* (which found a South Arterial feasible from an economic, engineering, traffic, environmental, and community perspective) by providing a more detailed analysis of the opportunities and constraints in the general study area, identifying engineering, environmental, and funding challenges, and preparing preliminary cost estimates to aid in the identification of a recommended alignment for the South Arterial. Once a specific alignment is selected and the impacts are analyzed and disclosed through the NEPA/MEPA process, the project could move into final design and construction depending on funding availability (Figure 1).

Figure 1 – Project Development Process



To avoid duplication of effort, this study incorporates information from previous planning efforts, including the *2003 Great Falls Area Transportation Plan, 2004 Great Falls Arterial Feasibility Study,* and 2005 *Great Falls Growth Policy*. However, because this study involves a more extensive examination and refinement of corridor issues, the study recommendations may not necessarily be synonymous with recommendations from these other referenced documents.

1.2. Study Area

The study area is located along the southern edge of the Great Falls urbanized area. Great Falls, located in north-central Montana at the juncture of three principal highways (I-15, US 87/89, and Montana 200), serves as the county seat for Cascade County. Great Falls is also the economic center of a wide region extending from central Montana to the Canadian border and from the Missouri River Badlands to the Rocky Mountains. Major economic attractions and employment centers include the Great Falls International Airport, Malmstrom Air Force Base, the Montana Air National Guard, major medical centers, and various industrial, wholesale, and retail businesses.

The study area, as initially defined in the *Feasibility Study,* is generally a three-mile-wide, eight-mile-long corridor located beyond the city limits, but within the southern edge of the Great Falls urbanized area. The corridor generally begins on the west at I-15, at or near the Gore Hill Interchange, and proceeds eastward through the Grande Vista residential subdivision area. After crossing the Missouri River, it extends easterly toward the Gibson Flats area to an intersection with 10th Avenue South and US 87/89 (MT Highway 3), at or near 57th Street South. The northern boundary of the corridor is generally delineated by 24th Avenue South, while the southern boundary of the study corridor generally follows the southern boundary of the Great Falls urban area. Intermittent east-west routes exist within the corridor; however, none provide a continuous connection between I-15 and US 87/89. A railroad line runs north-south along the Missouri River and east-west through the southern edge of the corridor along Sand Coulee

Creek. The east terminus of the corridor is near Malmstrom Air Force Base, while the west terminus is near the Great Falls International Airport. Land uses within the corridor are predominantly agricultural and residential with some pockets of commercial development, typically near both ends of the corridor. All or parts of four cemeteries are also located in the corridor. The majority of land within the corridor is undeveloped and located outside of the corporate limits of Great Falls. Predominant non-built features of the corridor include the Missouri River and associated wetlands, a large floodplain associated with Sand Coulee Creek, a prominent bluff, and the Great Falls Portage National Historic Landmark, which runs diagonally through a center portion of the corridor. The study area is illustrated in Figure 2.

1.3. Study Process

The study process involved corridor mapping, a planning-level environmental review, alignment analysis based on engineering design criteria and identified corridor constraints, public input, resource agency coordination, and funding considerations.

Quantm, a modeling software program, was used to help identify feasible alignment or route options. Quantm is a route-optimization software program that uses engineering design standards, as well as man-made and natural constraints, to develop and screen new roadway alignments. The program simultaneously weighs factors such as impacts to homes and businesses, historic and cultural sites, and wetlands, as well as construction costs associated with topography, earthwork, structures, and paving. The program can generate thousands of alignments to help determine the most cost-effective option given the defined constraints.

An important part of the study process was the identification of route location opportunities and issues by the region's stakeholders, which generally included federal, state, and local agencies with a direct interest in the project or those who offered special technical expertise. The early identification of corridor issues helps to improve the transportation planning process by providing a more efficient, less costly NEPA/MEPA process.

Insert Figure 2 – Study Area

1.4. Linking Transportation Planning and NEPA

In February 2005, the U.S. Department of Transportation issued guidance on how transportation planning-level products and analyses can be incorporated into the NEPA/MEPA process, based on long-term congressional intent that transportation planning should serve as the foundation for project level decisions. Although the statewide and metropolitan-planning provisions have been a federal requirement for over 40 years, formal NEPA/MEPA analyses have been largely disconnected from transportation plans. There has been no meaningful way for federal or state regulatory agencies to participate in and be a part of the planning process, especially considering most statewide plans are policy plans that are not project-specific. Historically, plans that recommended specific projects were done by planners based on federal requirements. Generally, it wasn't until funding was identified for project development and implementation that a preliminary design concept for the project was advanced through the NEPA process. Often work and analyses already done at the planning-level were repeated. This often resulted in redundancy of analyses, costly and often unfundable preferred alternatives requiring phasing of projects, and consequently, delays in implementing the entire preferred alternative.

Environmental review, analyses, and coordination at the planning-level should provide for better project scoping before a formal environmental review process is initiated. Linking transportation planning and NEPA has been strengthened in recent federal transportation legislation. The most recent is the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which requires planning-level coordination with natural resource regulatory agencies and encourages consideration of results from transportation planning efforts in the NEPA/MEPA process. In doing so, savings in project development and implementation time and cost should be realized.

This study was done in accordance with the "linking transportation planning and NEPA/MEPA" guidelines contained in the FHWA and Federal Transit Administration's (FTA) February 14, 2007, *Final Rule on Statewide Transportation Planning and Metropolitan Transportation Planning–Appendix A*. The products and analyses developed through this planning-level study are intended to be incorporated into and relied upon in a future, more
detailed NEPA/MEPA document.

2. BACKGROUND

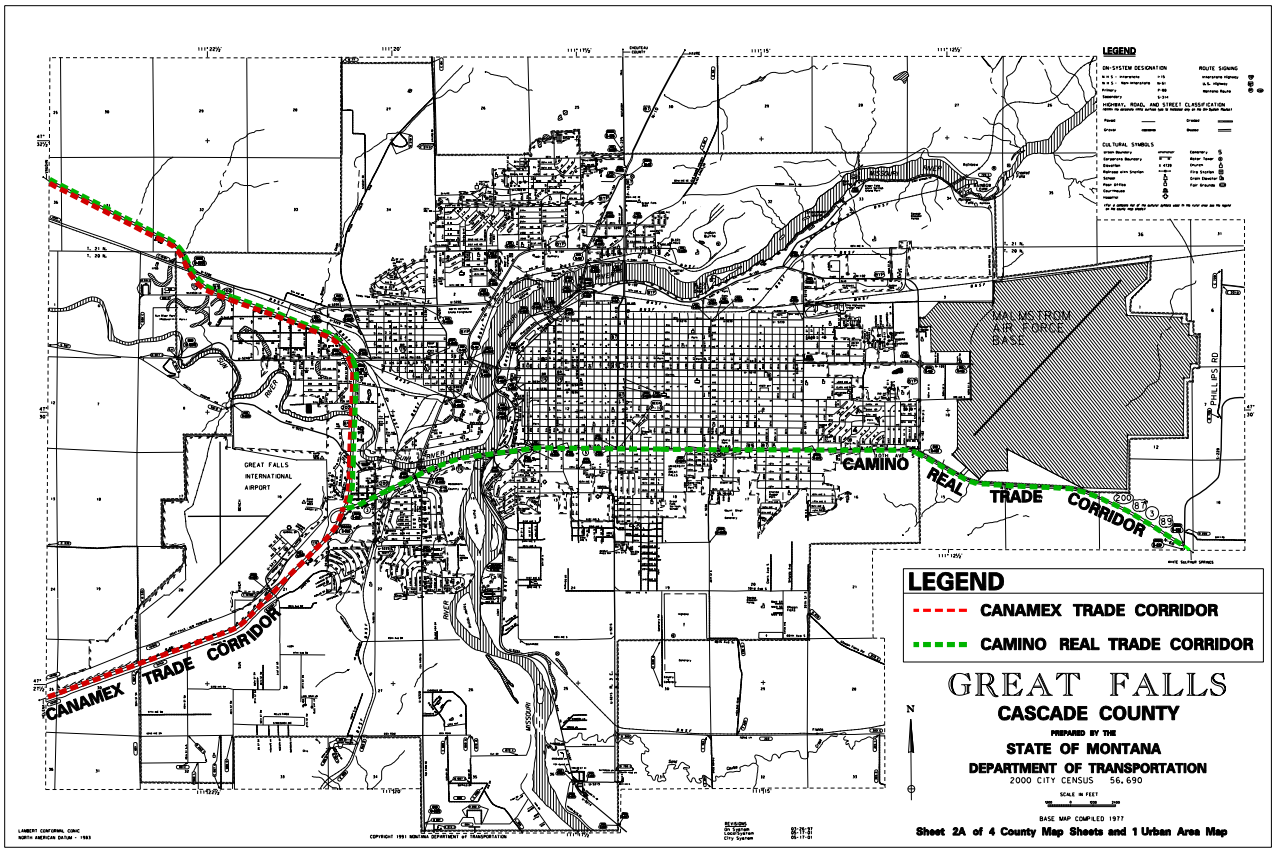
2.1. History

The South Arterial has been the subject of numerous plans, studies, and news articles since the late 1960s. By the late 1970s and early 1980s, Great Falls was on the verge of buying right-of-way for the project after completion of a route study in 1981. However at the same time, the refinery on Smelter Hill closed, the air base experienced personnel reductions, and other downturns in the local economy didn't support budgeting for right-of-way acquisition. Considering this economic slump, the Great Falls community leaders chose not to proceed with the acquisition. Consequently, available federal transportation funds were declined.

In the early to mid-1980s, the U.S. Department of Defense also studied the possibility of a South Arterial serving as an alternate route to 10th Avenue South for transporting a proposed missile deployment vehicle dubbed the "Midgetman." The interest in the prototype vehicle and arterial were dropped in about 1988.

With passage of the North American Free Trade Agreement (NAFTA) in 1993, there was renewed interest to pursue an arterial connector route between US 87/89 and I-15 as a means to promote regional and international trade along the Camino Real and CANAMEX trade corridors (Figure 3).

Figure 3 – Trade Corridors through Great Falls



In 1994, both the Great Falls City and Cascade County Commissions adopted resolutions supporting a process to solicit commitments to secure funds for the South Arterial and to dovetail it into a broader need for upgrading the highway between Great Falls and Billings. A "working group" representing the City, County, Chamber of Commerce, City-County Planning Board, and Great Falls Economic Development Authority was created to secure broad-based commitments for the proposed arterial project.

Working group representatives held numerous meetings and discussions with various community and statewide groups and organizations, including the Montana Department of Transportation, the Montana Transportation Commission, and the Governor's office. The culmination of its efforts was the development of a "Strategy Plan." The plan contained the following specific steps for development of the arterial:

1. Formally incorporate the arterial into the *Great Falls Area Transportation Plan*.
2. Conduct a corridor feasibility study.
3. Conduct a route location study and environmental review process.
4. Work with the Montana Department of Transportation to place the route on a federal-aid system and on its construction priority program.
5. Work with the Montana Department of Transportation, the Montana congressional delegation, and others to secure funds for final design and right-of-way acquisition.
6. Continue long-term plans for phased project construction.

The first two steps of the Strategy Plan have been completed. The proposed arterial was included in the *Great Falls Transportation Plan* in 2000, and a Feasibility Study was completed in 2004. In February 2005, based upon favorable recommendations from the Feasibility Study, the Montana Transportation Commission authorized MDT to take the lead of the project and to pursue federal discretionary funding for continued development of the South Arterial, including preparation of an Alignment Study, an environmental document, and project design. The advancement of each of these phases requires separate Commission action. This Alignment Study was initiated after $4,500,000 of congressional funding was secured through SAFETEA-LU.

2.2. Previous Planning Efforts and Products

2.2.1. *Great Falls Growth Policy* - 2005

The *Great Falls Growth Policy* recommended the transportation plan place a high priority on planning to preserve right-of-way for a limited-access freeway south of Great
Falls. The growth policy also recommended that the City and County should carefully regulate the design and location of future land uses, utilities, and major street intersections along the corridor where the South Arterial may be located.

The *2005 Great Falls Growth Policy* is based largely upon the former *2003 Great Falls City-County Growth Policy* with only minor editorial changes to reflect a change in planning area jurisdiction. The new jurisdiction includes primarily the City of Great Falls and those unincorporated areas into which it will logically expand in the next few decades. Due to a Cascade County Commission resolution, the Great Falls City-County Planning Board and associated jurisdictional area were dissolved effective July 1, 2005. To provide continued guidance to the City of Great Falls on growth issues, the City Commission created the Great Falls Planning Board and requested it revise the *2003 Great Falls City-County Growth Policy* to

represent the needs of the City. This revised *2005 Great Falls Growth Policy* provides the legal and rational basis for land use and zoning regulations, public investments, or government programs or actions.

2.2.2 *Great Falls Arterial Feasibility Study* - 2004

The Feasibility Study was completed and distributed in March 2004. It evaluated the engineering and economic feasibility of alignment corridors both north and south of Great Falls. It also provided first-level environmental screening for a variety of roadway alternatives ranging from four-lane freeways to rural two-lane arterials. Based on Federal Highway Administration *Guidelines for Highway Feasibility Studies*, the study concluded that compared to a "no-build" alternative, a southern corridor is feasible and preferred. It was found to be feasible from a number of specific perspectives including:

- An economic perspective - in that, a favorable benefit/cost ratio of 3.54 could be derived, meaning there would be a net return of $3.54 for each $1 expended to build and maintain the arterial.
- An engineering perspective - in that, standard project development and design procedures could adequately identify and address any engineering issues associated with the arterial.
- An environmental perspective - in that, no "fatal flaws" were identified that could preclude further development of the arterial.
- A traffic perspective - in that, the arterial would improve safety and reduce congestion, which would help reduce crashes and solve intersection capacity problems on 10th Avenue South, Fox Farm Road, and elsewhere on the Great Falls street network.
- A community perspective - in that, the arterial was found to be consistent with community goals and plans and fulfills recommendations made in local planning documents and policies.

The study also concluded that a northern corridor would not satisfy the FHWA-recommended guidelines for project feasibility, because it failed to achieve an economic threshold benefit/cost ratio of 1.0 or better. As such, it recommended that no further study of the northern corridor be conducted. However, the report did recommend the continued study and development of the southern corridor to include preparation of an Alignment Study and environmental document. A four-lane urban arterial was selected as the "technically recommended" roadway alternative to best serve current and future needs in the Great Falls urbanized area.

2.2.3. Great Falls Area Transportation Plan - 2003

The transportation plan involved both short-term and long-term planning and recommended improvements to the Great Falls major street network. The recommendations contained within the transportation plan serve to ease congestion, improve safety and mobility, and prepare the Great Falls street network to meet future traffic needs.

The plan noted that the Great Falls street network exhibited congestion along 10th Avenue South, Fox Farm Road, and various other adjacent roadways. The plan identified the lack of a sufficient direct roadway link between two highways of national significance (I-15 and US 87/89). The plan recommended that a minimum two-lane roadway be constructed south of Great Falls, between I-15 and the intersection of 10th Avenue South/57th Street South with consideration for an ultimate four-lane roadway in the future. The plan continued by stating "*the facility will help to not only better serve, promote, and accommodate regional and international trade through the community, but will also benefit the Great Falls area transportation system by providing an additional east-west route suitable for economic development*" as well as provide additional

benefits "*to include improved local access and circulation, promotion of economic development, and the development of an additional Missouri River crossing for emergency services.*"

2.2.4. Other Studies

Over the last several years, additional studies have been conducted regarding the need and public support for a South Arterial. The following are summarized in the *Great Falls Arterial Feasibility Study*:

a. *Great Falls City-County Growth Policy* – 2003
b. *Great Falls City-County Comprehensive Plan* – 1999
c. *Findings of No Significant Impact on the Environmental Assessment for Great Falls, 10th Avenue South* – 1998
d. *Environmental Assessment for Great Falls, 10th Avenue South* – 1997
e. *Traffic Impact of Small Intercontinental Ballistic Missile (SICBM) Program on 10th Avenue South* – 1987
f. *Great Falls South Arterial Final Environmental Impact Statement* – 1981
g. *Great Falls Area Transportation Plan Updates* (1961, 1969, 1979)

These studies all document or discuss the need for a South Arterial as a major component or probable element of the future street network for the Great Falls area. Most indicate that a South Arterial would be necessary to reduce congestion on the Great Falls street network, especially in reducing the amount of traffic on 10th Avenue South. Some of these studies also emphasize the importance of preserving right-of-way for a future South Arterial and that local officials should carefully regulate, to the extent allowed by local land use policies and regulations, the design and location of future land uses, utilities, and major street intersections along the proposed South Arterial corridor.

3. GOALS AND OBJECTIVES

Consideration of and interest in a new arterial are in response to the long-range planning goals and objectives documented in the community planning reports and studies noted in the previous section. Additionally, consistent public input has indicated a need for an east-west arterial south of 10th Avenue South. These planning documents and detailed traffic analysis indicate that roadways within the 10th Avenue South corridor and adjoining street network have high crash rates, poor levels of service, and high truck volumes. Based on the Feasibility Study findings, the goals for and objectives of a new east-west arterial south of Great Falls are to:

- Improve an international and regional trade corridor.
- Reduce congestion along 10th Avenue South and numerous other urban area arterial and collector streets.
- Improve safety and mobility throughout the Great Falls transportation network.
- Improve air quality by reducing congestion as well as stopping and idling times.
- Provide an additional Missouri River crossing essential for efficient emergency vehicle access.

These goals and objectives will be further considered through this study process and refined as appropriate, based on the study's analysis, public involvement, and resource agency consultation efforts.

4. PUBLIC INVOLVEMENT AND AGENCY OUTREACH

As part of the *Great Falls South Arterial Alignment Study* public involvement process three public meetings were held: February 15, 2007, October 9, 2007, and September 25, 2008. All meetings followed the same format with a brief opening presentation, followed with an "open house" where participants could individually ask questions. Handouts and comment sheets were circulated at each of the meetings, which were advertised using direct postcard mailings, print ads, and press releases through the Great Falls Tribune. All comments and the presentations for the
public meetings are included in Appendix 4A of this document.

Meetings with regulatory agencies and local officials were also conducted during this study and are summarized in the following section.

4.1. Public Meeting #1

Darryl James from HKM Engineering provided a brief presentation to outline the history of the project and explain the project development process.

There was an extensive question and answer period during which HKM and MDT staff provided more detail on the proposed project and comments were then taken from those in attendance. There were 143 people that signed in at the meeting.

Recurring themes in the comments received included:

- Questions about where the arterial would begin and end;
- Concern over whether trucks would be attracted to the south arterial;
- Opposition to the project due to potential impacts upon nearby residents; and,
- Strong support for the arterial based on growth of the community and the need for an additional river crossing.

4.2. Public Meeting #2

Darryl James, of HKM Engineering, provided a brief presentation that gave the history of the project, the project development process, the Quantm software, and the range of alternatives being considered. Questions and comments were then taken from those in attendance. There were 128 people that signed in at the meeting.

Common themes of the comments received included:

- How access would be provided to the new arterial;
- What the road itself would look like;
- What type of land use would be allowed near the roadway;
- Opposition to the project based on the belief that the roadway would change the character of the area; and,
- Strong support for the South Arterial to move forward and that "it is time to stop talking about it".

The public participants in attendance were asked to prioritize the goals for the South Arterial and asked to identify a recommended alignment. Respondents felt that reducing congestion along 10th Avenue South and numerous other urban arterial collector streets was of utmost importance, while improving safety and providing an additional river crossing south of 10th Avenue South were highly desirable as well. Improving air quality and providing an opportunity for a future

international trade corridor were rated lower by the participants. The majority in attendance identified the Red Alignment as their recommended alignment.

4.3. Agency Coordination Meetings

Representatives from the Montana Department of Environmental Quality, Montana Fish, Wildlife & Parks, US Fish and Wildlife Service, US Army Corps of Engineers, Montana Department of Natural Resource and Conservation, Montana State Historic Preservation Office, and the National Park Service attended at least one of three Agency Coordination Meetings held in Helena during early project development.

Darryl James, of HKM Engineering, provided presentations to outline the project history, project development process, Quantm software, known constraints and avoid zones used within Quantm, and the alignment analysis process.

An initial meeting was held to discuss known and potential corridor constraints, as well as analysis methodologies for the Alignment Study and the initial five alignments were presented. The National Historic Landmark (NHL) was discussed as an important 4(f) resource and participants requested that options that avoid this resource be analyzed also.

The second meeting presented the recommended alignment as recommended by the project management team consisting of the City of Great Falls, Cascade County, MDT and FHWA representatives. The team requested concurrence from the agencies on the purpose and need statement, as well as the recommended alignment.

The group discussed the six alignment options and the analysis criteria and screening process. The team explained that five of the six alignments cross the Great Falls Portage National Historic Landmark, a Section 4(f) property, and the sixth alignment was developed to completely avoid the NHL. The resource agency representatives agreed that four of the alignments could be eliminated from further evaluation based on impacts. The group also agreed that two of the alignments should be investigated further. The alignments included the Red Alignment, which crosses the Landmark and the Purple Alignment, which totally avoids the Landmark.

The discussion continued on the characteristics of the Red Alignment, including the proposed termini near the Gore Hill Interchange and at 57th Street South. The roadway is anticipated to be a four-lane rural principal arterial with a 60 mph design speed with direct access from Fox Farm Road, Upper River Road, 13th Street South, and 26th Street South. The group then discussed the potential of phased implementation with construction of the shortest segment with independent utility and logical termini. It was determined through earlier analysis, that the shortest segment that could be constructed without a substantial amount of waste or borrow material would be the segment between Fox Farm Road and 13th Street South. Based on travel demand modeling, this segment
could fulfill the primary parts of the purpose and need statement by reducing congestion on 10th Avenue South and providing an additional river crossing south of 10th Avenue South.

With the inclusion of the Purple Alignment as a potential avoidance alternative, the resource agency representatives expressed their support for the proposed project. The team discussed the opportunity for further review and comment as the draft report would be issued in the coming months.

Travel demand modeling was performed for the NHL avoid alignment (Purple) as follow up to comments received at the second resource agency meeting. Results from model runs on the NHL avoid alignment showed greatly reduced travel demand on the segment between Fox Farm Road and US 87/89 (50% to 60% reduction), due to extended travel times and lack of road network connections. Also, beneficial relief in traffic volumes on the 10th Avenue South and other major network corridors was not achieved. As such it was determined that the NHL avoid alignment would not meet the purpose and need of the study.

A follow-up meeting was held in Great Falls with project management team members and representatives from the National Park Service and state and local historic preservation groups to explain the study in greater detail. After the meeting the group went on a field review of the study area. They were shown the probable path of the recommended and NHL avoid alignments as well as major features of the area. Once the general location of the avoid alignment was understood, they agreed it would detract from the viewshed of the NHL. After the field review, resource agency and preservation group members stated their endorsement for the recommended (Red) alignment and agreed that the avoid alignment (Purple) does not meet purpose and need and consequently is not prudent.

4.4. Meetings with Local Officials

Two meetings were held with local officials during the study process. The first was held in Great Falls to introduce the study and to gauge local support. The meeting also included a discussion of the limited availability of funds in state and federal transportation budgets to construct an arterial. MDT officials encouraged local officials to help define a realistic funding package that would include local and private assistance.

A second meeting was held through video conferencing, during which local officials were provided an overview of the study process to date and were presented the draft purpose and need statement for the Arterial. They advised that the project management team recommended the Red Alignment. The purpose of the meeting was to obtain local official concurrence on the draft purpose and need statement and the recommended alignment. Most of those in attendance suggested they wanted to withhold a formal decision until they had an opportunity to discuss the project in more detail.

There was a detailed discussion of project costs and funding options. At present, the project is anticipated to cost approximately $208 to $285 million for a full arterial and $83 to $93 million for an initial phase from Fox Farm Road to 13th Street South. Under new FHWA rules, the MPO must demonstrate reasonable availability of funding for the next phase of the project before the project can proceed. In this case, MDT advised there are sufficient funds available to develop a NEPA/MEPA compliance document, but that the reasonably available funds for the full arterial or an operationally independent segment need to be included in the ongoing *Great Falls Transportation Plan Update*. A subsequent project phase such as full PE or RW would also need to be included in the MPO Transportation Improvement Program (TIP) and MDT Statewide Transportation Improvement Program (STIP).

The project management team identified the following as potential sources of funding for future project phases:

> Congestion Mitigation and Air Quality Program (CMAQ) - for projects that improve air quality in "non-attainment" or "maintenance" areas.
>
> Transportation and Community and System Preservation Pilot Program (TCSP) - for projects that improve the efficiency of the transportation system, reduce impacts, and reduce future

need for infrastructure improvements through more efficient access. Recent trends have directed grants to the six largest cities nationwide.

Congressional Appropriations - note that a January executive order pledged to veto any appropriations bill that does not cut the number and cost of "earmarks" in half.

State Fuel Tax - annual allocation to local governments based on formulas provided through state statute and must be used on construction, reconstruction, maintenance, and repair of rural roads or city streets and alleys.

State Sales Tax - establishment of a state sales tax could provide a valuable source of additional funding.

City/County General Fund - includes property taxes, development fees, and other sources of general fund revenue.

Local Fees - includes impact fees, permits, vehicle license fees, etc.

Local Option Taxes - Approved by a local referendum and can include a gas tax, motor vehicle tax, and resort tax.

4.5. Public Meeting #3

Information to be provided following the meeting.

5. QUANTM

The Quantm system is a planning tool that uses route optimization software to generate multiple cost-based alignments that satisfy defined constraints and scenarios. The Quantm system generates multiple alignments allowing the project management team to balance social and environmental impacts against alignment costs. The Quantm system also provides the project management team with the ability to optimize sections of alignments to allow construction of portions of a corridor as funding becomes available.

5.1. Background

Historically, the first step in the selection of new highway alignments is to survey the existing terrain, roadways, utilities, streams, wetlands, structures, and other improvements. Additionally, information is collected regarding geology, floodplains, land use, social and economic impact, and historical and environmentally sensitive areas. Collection of this data can take a substantial amount of time and can alert local communities and landowners who may become concerned they will be adversely affected by an alignment long before the Alignment Study has started.

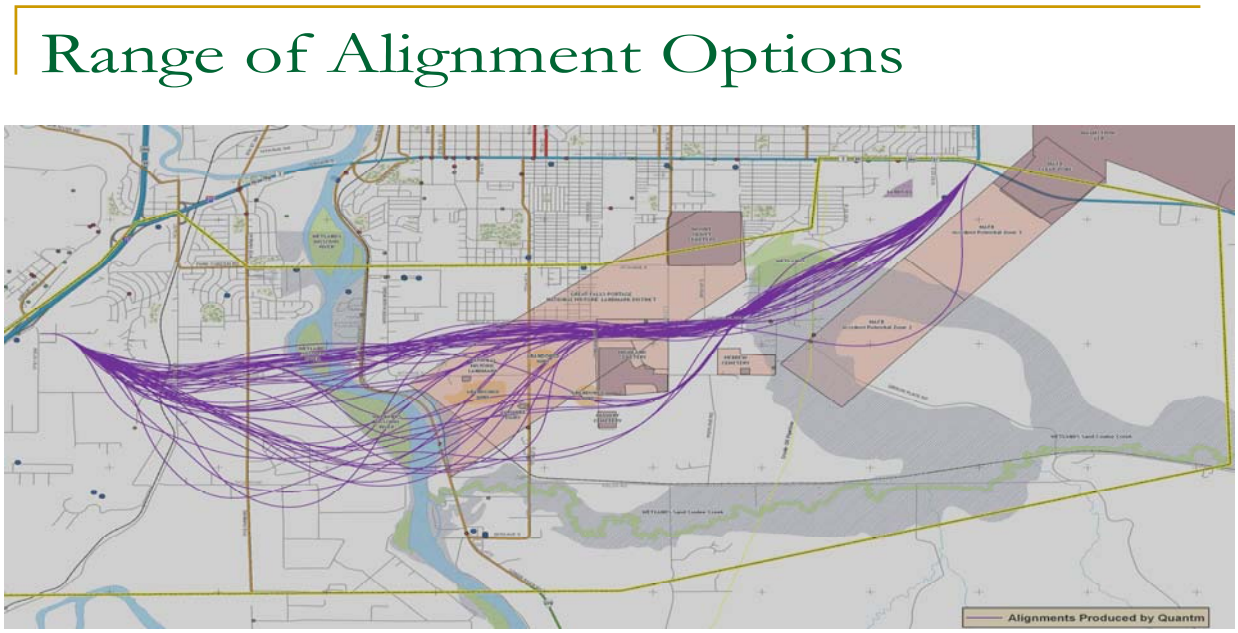
Proposed alignments are then developed using the survey information and data collected within a corridor. The surveyed corridor widths have historically been limited by available survey staff, terrain, funding, and time. Each optimized alignment could take from several days to several months to develop. The most cost-effective alignments follow existing terrain and limit large cut and fill sections; however, the alignments must also meet Geometric Design Standards and avoid social and environmentally sensitive areas.

5.2. Optimization

The corridor selected for the *Great Falls South Arterial Alignment Study* was taken from the *Great Falls Arterial Feasibility Study*. Within this broad corridor the Quantm system incorporates a variety of information including terrain (DTM data), linear features (rivers, roadways, railroads, pipelines), special zones (parks, cemeteries, floodplains, wetlands, property data, subdivisions), geotechnical zones, geometric standards, structure sizes, and construction cost estimates.

Once a beginning and end point were specified, several thousand alignments were generated through a defined corridor. The 50 lowest cost alignments were then color coded and presented in a “spaghetti map” (Figure 4). Each alignment included a horizontal and vertical profile, cross sections, mass diagram, structure locations and lengths, list of impacts, estimate of right-of-way impacts, and a detailed cost estimate.

Figure 4 - Range of Alignments



The project management team then selected several unique alignments based on cost and minimal social, economic, and environmental impacts to the area. These "seed" alignments were then returned to Quantm for optimization, which was the process of making improvements to the vertical profile and earthwork with minor adjustments to the horizontal alignment. The project management team again selected several recommended alignments from the optimized alignments, further balancing social and environmental impacts against alignment costs.

These selected alignments were presented to the public, resource agencies, and other stakeholder groups for review and comment. Comments from these groups were used to further refine the accuracy of the base map and to select final alignments for further optimization and analysis.

5.3. Model Interface

Geometry

The Quantm system requires a basic description of the minimum geometric standards of the alignment including minimum radii of curvature, maximum gradients, sight distance, and location and bearing at project endpoints.

Terrain

A form of Digital Terrain Model is necessary to calculate earthwork.

Geology

The cost of earthwork is dependent on local geology. Each geological type specified can have a number of strata with individual characteristics of batter, bench width, and excavation costs.

Linear Features

Most corridors include linear features such as roads, rivers, railways, and pipelines that must be crossed. Some crossings must be at grade and others may require overhead structures providing specified horizontal and vertical clearances.

Special Zones

There are frequently zones that require special treatment for social or environmental reasons. Special zones can be designated as complete avoid areas, additional cost, or special mitigation. Even when an alignment is allowed through a special zone it may require a specified roadbed elevation, additional cost, or mitigation measures.

Construction Costs

The latest construction cost estimates are used to estimate structure cost, culverts, fill, cut (based on strata), tunnels, and retaining walls. Additional costs are also included in the linear feature descriptions and special zones.

6. DATA INPUT AND EXISTING CONDITIONS

6.1. Geographic Data and Mapping

6.1.1. Data Creation

Data was collected and created by the Road Inventory and Mapping Section (RIM) using ESRI ArcGIS software. As needs were identified for certain data sets to be included in Quantm as Special Zones and/or Linear Features (Table 1), RIM first relied on currently available data sets. If a data set was not available from another source such as the City of Great Falls or Geographic Information System (GIS) data repositories like National Resource Information System (NRIS), the data was digitized using Ortho Imagery from the 2005 National Agriculture Imagery Program (NAIP). Data was verified by appropriate MDT staff once it was identified and mapped. The data that was verified was then used as the parameters for Quantm. The verified data sets were sent to Quantm to be exported in the appropriate format to be used in the software for analysis of possible new alignments.

Table 1. Data Used Within Quantm

Linear Features	Roads, Interchange Ramps, Railroad
Special Zones	AVOID: Ayrshire Dairy, Ayrshire Dairy Undaunted Site, Malmstrom Air Force Base, Calvary Cemetery, Mount Olivet Cemetery, Hebrew Cemetery, Highland Cemetery ADDITIONAL COSTS: Great Falls Portage National Historic Landmark[1], Wetlands, Missouri River, Floodplains, Private Land & Structures, Landfill
Additional Data	Study Area Boundary, Drainage, Abandoned Mines, Public Water Supplies, Underground Storage Tanks, Parks, Crude Oil Pipeline

Sources for each data element are identified in Appendix 6a. 1. One Quantm run treated the National Historic Landmark as an avoid zone.

6.1.2. Mapping

Data that was produced by Quantm was exported to GIS layers, so it could be used for mapping. These maps were produced with the original data submitted to be used for analysis in Quantm, along with the Quantm alignments.

These maps were used for public meetings and for project management team meetings while the study was taking place. They are intended to be used as a visual representation of what Quantm is analyzing and producing. They are also used as a planning tool for identification of created data sets used in Quantm.

6.2 Construction and Project Costs

A key component to the Quantm software is the input of reliable costs. Quantm allows the user to input construction and material costs, land acquisition costs, environmental mitigation costs, and any additional fixed cost that may be associated with a particular project. By using the most reliable and up-to-date information available, the Quantm model produces fiscally responsible alignments which meet all design and land use criteria. This section will discuss these "data-based" costs, which were researched in depth to produce reliable construction and project costs.

6.2.1. Geological Type

In Quantm, the geological-type data field allows the user to enter cost data associated with the earthwork required to build the roadway specified by design and geometric criteria. The costs associated with this data field are costs to haul material, cut or excavate material in the roadway, fill or place the material in the roadway, the cost to waste excess material, and the cost to borrow material, which means the importing of material to build the roadway. For this study, haul-and-waste costs are set to zero, because these costs are not tracked and paid for under current MDT federal-aid contracts. They are considered incidental costs and not separated out for payment. These costs can be applied to different geological types identified within the studied corridor. Examples of geological types are rock formations or floodplain areas.

Because this study is a planning-based study, a formal soil survey or soil identification study was not conducted. Instead, general observations were made based on visual inspection of the study area. The results of this inspection yielded three general geological types:

- Normal Area – typical earthwork conditions for road building. A "default" value was used for this type, which includes a majority of the project area.
- Floodplain Area – requires special means to construct the roadway due to soft and/or saturated soil conditions.
- "Gore Rock" Area – requires ripping and possibly blasting of material to build roadway (Gore Hill rock plateau area located on the west-end).

The floodplain areas and the "Gore Rock" area have higher construction costs associated with them for the reasons stated above.

The costs assigned to these geological types are derived from recent federal-aid construction projects administered by MDT's Great Falls District. These costs are located in Appendix 6B. Contracts completed within the last five years were studied with emphasis given to the most recent contracts completed in and around the City of Great Falls. It should be noted recent fuel price escalation has caused a dramatic increase in contract bid items such as asphalt oil, roadway excavation, gravel, and numerous other items. These increases have all occurred since the completion of the *Feasibility Study*.

6.2.2. Network/Geometric-Based Costs

Quantm's network-based or geometric-based costs are indirect costs based on the geometric design criteria used. What this means is the overall cost model output is influenced by the geometric design criteria. For both two-lane and four-lane configurations, MDT design criteria were used with much discussion centering around the start and endpoints for this study.

For this study, the western start point was assumed to be near the Flying J Truck Stop at the I-15 Airport Interchange. During this study, numerous public comments were received asking questions about how the South Arterial would connect to the interstate and other roadways in this area. It was decided more detailed information and study were required before the location of the start point could be defined. Therefore, the start point will remain variable at this time and open to solutions based on future study.

The eastern endpoint for this study was located at the intersection of 10th Avenue South and 57th Street. Like the start point, this endpoint will also remain variable at this time and open to

solutions based on future study. From a cost standpoint, any future study should recognize that moving these critical points could generate additional project cost.

The remaining geometric design factors require little discussion from a cost standpoint except the horizontal and vertical "stiffness" factors.

In Quantm, these "stiffness" factors represent how straight an alignment is from both the horizontal and vertical perspective. Since this "stiffness" factor is somewhat subjective to the user, numerous iterations were performed to best optimize cost and the creation of a reasonably straight alignment and profile. The Great Falls area generally has a consistent north-south/east-west grid with minimal curvature in most roads in the study area. This observation was used in determining the most appropriate stiffness factors while maintaining a reasonable project cost.

6.2.3. Roadway Surfacing and Bridge Costs

The roadway surfacing costs were derived from the most recent federal-aid projects available at the time of this study. The roadway surfacing costs include gravel, asphalt surfacing, chip sealing, and final roadway striping. Since the *Feasibility Study* was completed, these roadway costs have increased substantially due mainly to higher fuel costs and material availability and supply. Even with these increases, asphalt surfacing was still less expensive than concrete surfacing. However, this study recommends concrete surfacing should not be discounted as a viable solution in future studies, especially at intersections.

Through the Quantm modeling, several obstacles were identified which required the incorporation of a bridge. These include the Missouri River, Burlington Northern railroad tracks adjacent to Flood Road and Flood Road itself, Lower River Road, and the Burlington Northern railroad tracks adjacent to Lower River Road. Aside from the direct cost of these bridges, the required clearances associated with spanning the railroad tracks, Flood Road, Lower River Road, and the Missouri River directly affect the vertical alignment and earthwork requirements.

Because Flood Road and the adjacent tracks are close together, the Quantm model created a single bridge to span both obstacles. This also means direct access to the South Arterial from Flood Road would not be physically possible. Access to the South Arterial from Flood Road would be indirect utilizing existing roadway networks.

The Missouri River crossing is by far the largest and most complicated crossing in the study area. Aside from the direct cost of this structure, one major indirect cost is if this bridge is completed prior to the roadway on either side, the embankment material will not be allowed to be hauled across the bridge due to structural concerns. This increases the overall project cost for the earthwork.

In general, the bridge costs for both a two-lane and a four-lane configuration include the cost of sidewalks, aesthetic features, and sound walls. Further study would determine what and if these items are needed or desired. The bridge costs also take into account the structure's complexities due to its overall length and size. Constructability and work access during bridge construction are issues that were factored into the cost of this bridge.

While the west-shore landing area is relatively straightforward, many issues revolving around the east-shore landing were recognized. The main issue is the fact that Lower River Road is located

on top of the east-shore bank throughout the study area. Also, the Burlington Northern railroads tracks are adjacent and very close to Lower River Road. These two factors limit available landing areas near the bank.

After review of the Quantm modeling runs, it is assumed in most locations one bridge will span the Missouri River, Lower River Road, and the BN railroad tracks. While this increases the overall bridge length and cost, it is the most feasible solution. Also, direct access from the South Arterial to Lower River Road would not be possible. Indirect access would be possible by using other existing roadway links.

6.2.4. Special Zone Costs

For the purpose of this study, a special zone is defined as an area or location that has a special condition attached to it such as a cost, limitation, or sensitive feature. This study includes the following types of special zones:

- Areas that must be avoided such as cemeteries
- Land and housing values
- Subdivision damage costs
- Wetlands and other environmentally sensitive areas
- Floodplains
- 4(f) properties

6.2.4.1. Avoid Areas

Areas such as cemeteries and parks should be avoided at all cost. The Quantm model will not allow alignments to enter into these areas, which generally means an alignment increases in length and cost. The major Section 4(f) property in the study area is the Great Falls Portage National Historic Landmark. The National Historic Landmark (NHL) is located primarily on privately owned lands and covers a large area
on the east side of the Missouri River. It was recognized if federal aid was used to construct an alignment in this area, evidence must be presented that shows avoiding this area is cost prohibitive and carries high social and economic impacts.

At the request of the resource agencies, the Quantm model was run with the NHL set as an avoid zone. The overall cost and housing impact was much greater than the other five alignments selected for public comment. The higher costs and greater housing impacts are due to the increased project length, impacts to the Sand Coulee floodplain area, and the numerous housing developments located south of the NHL.

6.2.4.2 Land and Housing Values

The alignment study area contains numerous housing developments which must be considered in Quantm's cost model. In recent years, this area has seen an increase in housing, which is expected to continue. Based on review of this area and the public comments received, housing and land impacts were identified as an important consideration for the Alignment Study.

Geographic Information System (GIS) mapping information was used to display every parcel of land in the study area. The mapping information was then combined with the most current Department of Revenue (DOR) appraisal information. With this combined data, parcels were considered based on zone type, size, number of structures associated with the parcel, condition of structures, and taxable value.

In addition, the most recent real estate sales information was collected through the local Multiple Listing Service (MLS) for the Great Falls area. The data included improved and unimproved property values broken out by size and general location. The MLS data revealed a wide array of land values. Property on the east end of the project is mostly farmland and has a relatively low cost per acre. Higher-cost properties are generally subdivided and developed, and are located in the vicinity of the Missouri River and at various locations between the Missouri River and the Gore Hill area on the west end of the corridor.

Using the MLS and DOR data as a guide, the most reliable property values possible at a planning-level were assigned to every parcel in the study area.[6] Thus, when the Quantm model was run, planning-level property costs were taken into account along with the construction costs to build the roadway. Assigning values ensured that the model would attempt to avoid as many houses as possible to keep the overall project cost and impacts as low as possible. Despite this effort to minimize impacts to housing, every Quantm model run resulted in acquisitions of some houses and structures to construct the South Arterial. It is worth noting that specific properties impacted cannot be determined through this planning-level study. Identification of specific impacted properties and potential mitigations will be done during the future environmental review and design processes.

With all property values in place, the Quantm model run produced 50 alignments to analyze. Upon review of the alignments, it was clear that they could be grouped into five distinct patterns or sub-corridors. The lowest-cost alignment in each of these patterns or sub-corridors was selected to present to the public for comment. At this point in the process, each of the five alignments was scrutinized closer in terms of housing impacts. A "buffer" zone was created for each alignment both for the two-lane and four-lane configuration. This buffer zone is a distance outside the limits of the roadway construction. If a house is inside this "buffer" zone, it was assumed the house or structure would have to be purchased for roadway construction. If a house or structure was close to this "buffer" zone, it would be evaluated on a case-by-case basis.

It should be noted all property values used in this study represent 2006 values. Given the growth in this area and expected inflation, the land and housing costs may increase. It is recommended land acquisition for corridor preservation be made a high priority in this project's future schedule.

6.2.4.3 Subdivision Damage Costs

Above and beyond housing and land costs, a separate cost was developed to account for the cost to mitigate subdivisions. This cost includes the relocation and rerouting of city and county connecting streets and roads, housing and structure demolition, infrastructure demolition, the redistribution of city utilities, the redistribution of utilities such as gas and electric lines, and the overall impact to the surrounding area. Aesthetic and sound mitigation measures were also

[6] This planning-level analysis allows for the identification, selection, and elimination of potential alignments, but lacks the precision to identify the specific properties or other features impacted. Property values were assigned only at a planning-level to ensure that the Quantm model runs would attempt to avoid as many impacts to houses as possible and to enhance comparison of impacts between various alignments. After the currently proposed alignments are reduced to one or more alignments, additional detailed and specific environmental analysis and design will then be conducted in future efforts, including the identification of specifically impacted properties and possible mitigation measures.

considered in this cost. Comparable cost data was not available, so these damage costs were assumed to be very high, in the range of $500,000 to $3,000,000 per acre depending on the size and location of each subdivision.

6.2.4.4 Wetlands and Other Environmentally Sensitive Areas

A cost was assigned to identified wetland areas and other environmental areas, such as underground storage tanks. The cost represents mitigation measures which could be required and is based on cost information from mitigation efforts performed in conjunction with past MDT projects.

6.2.4.5 Floodplains

Floodways and floodplains associated with the Missouri River and Sand Coulee Creek are located within the project corridor. The following FEMA floodplain maps for Cascade County delineate the floodways and floodplains within the project corridor:

Community – Panel Number	Map Revised
300008406B	December 8, 1981
300008407C	February 15, 2002
300008426C	February 15, 2002
300008427C	February 15, 2002
Community – Panel Number	Map Revised
300008408B	December 8, 1981
300008409B	December 8, 1981
300008428C	February 15, 2002
300008429C	February 15, 2002

These areas were mapped and made a part of the Quantm model. The Quantm model required bridges across floodways. Costs in floodplain areas were increased to account for minimum elevation requirements and hydraulic conveyance. This cost represents the extra requirements needed for approval to build in the floodplain.

6.2.5. Additional Fixed Costs

The Quantm model allows the use of fixed costs, which are assumed to remain unchanged regardless of the alignment selected. The following are the fixed cost elements used for both the two-lane and four-lane configurations:

- A New or Upgraded Gore Hill Interchange
- Electrical Items and Traffic Signals
- Design and Preliminary Engineering Costs
- Utility Relocation Costs (Gas, Electric, Phone, TV)
- Traffic Control
- Construction Engineering
- Miscellaneous Items
- City Utilities (Water, Sewer, Storm Drain)

A New Gore Hill Interchange was included because the existing Gore Hill Interchange with its frontage roads has very little room for expansion. At this time, it appears a new interchange

south of the existing interchange would be the likely solution.[7] The new interchange cost includes the building of a new interchange, modification to the frontage roads and connecting roads, traffic signals, land acquisition, and the demolition of the ramps on the existing Gore Hill Interchange. Most likely, the ramps on the existing interchange would require demolition because of the close proximity of the new interchange.

6.3. Design Criteria

Design criteria for roadways include maximum grades, design speed, minimum rates of vertical curvature (crest and sag), superelevation, minimum horizontal curvature (radii), and vertical clearances. Recommended ranges and minimum and maximum values for these design features are listed within the MDT Road Design Manual.

Tables 2 and 3 list the design criteria input into the Quantm Model Interface for the four lane and two lane undivided highway alternatives:

[7] Based on MDT travel demand modeling, the further south the route would begin, the less traffic the new roadway would attract, and the less likely a South Arterial would meet its intended purpose. Additionally, the longer the road length, the greater the project cost. Beginning the new roadway at Ulm and extending to US 87/89 would add an estimated $54 million to the project cost based on an estimated cost-per-mile factor of $7.4 million.

Table 2. Quantm Data – Four-Lane – Rural Principal Arterial

Criteria	Note	Input
Start Point		TBD
End Point		TBD
Maximum Design Grade	Downhill	-4% - Rolling Terrain w/60 mph design speed (-7% - Mountainous)
	Uphill	+4% - Rolling Terrain w/60 mph design speed (+7% - Mountainous)
Maximum Sustained Grade	Downhill	N/A
	Uphill	N/A
	Sustained Distance	N/A
Formation Width (ft) in Cut		154 ft
Formation Width (ft) in Fill		114 ft
Minimum Vertical Radii	Crests (k value)	151 (60 mph)
	Sags (k value)	136 (60 mph)
Minimum Horizontal Radii		1200 ft @ 8.0%
Road Coordination	Sight Distance	570 ft - level ; 610 ft - downhill ; 530 ft - uphill
	Eye Level	3.5 ft
	Object Level	2.0 ft
Batter Slope (Fill)	Inslope	6:1
Batter Slope (Cut)	Backslope	3:1

*Formation width is based on roadway template hinge points for cut/fill sections.
**Batter (Cut/Fill) is roadway inslope and backslope.

Table 3. Quantm Data – Two-Lane – Rural Principal Arterial

Criteria	Note	Input
Start Point		TBD
End Point		TBD
Maximum Design Grade	Downhill	-4% - Rolling Terrain w/60 mph design speed (-7% - Mountainous)
	Uphill	+4% - Rolling Terrain w/60 mph design speed (+7% - Mountainous)
Maximum Sustained Grade	Downhill	N/A
	Uphill	N/A
	Sustained Distance	N/A
Formation Width (ft) in Cut		110 ft
Formation Width (ft) in Fill		70 ft
Minimum Vertical Radii	Crests (k value)	151 (60 mph)
	Sags (k value)	136 (60 mph)
Minimum Horizontal Radii		1200 ft @ 8.0%
Road Coordination	Sight Distance	570 ft - level ; 610 ft - downhill ; 530 ft - uphill
	Eye Level	3.5 ft
	Object Level	2.0 ft
Batter Slope (Fill)	Inslope	6:1
Batter Slope (Cut)	Backslope	3:1

*Formation width is based on roadway template hinge points for cut/fill sections.
**Batter (Cut/Fill) is roadway inslope and backslope.

Detailed information from MDT's Road Design Manual regarding the design criteria selected is included in Appendix 6C of this report.

6.4. Environmental

The primary objective of the Environmental Scan Report was to determine the potential environmental impacts or constraints that may be imposed upon the Great Falls South Arterial Alignment Study. The Environmental Scan Report contains a description of the following sections.

- Physical Resources;
    - Land Ownership
    - Geology and Soils
    - Surface Water and Groundwater
    - Floodplains
    - Wetlands
    - Hazardous Waste Areas
    - Air Quality
    - Noise

- Biological Resources
    - Fish and Wildlife
    - Vegetation
- Cultural Resources;
- Utilities.

Based on a planning-level overview of environmental resources in the corridor it was determined that the proposed South Arterial would likely have no impacts to the following:

- 6(f) properties
- Threatened & endangered species
- Air quality (non attainment areas)

The following resource areas may potentially be impacted by the South Arterial:

- Great Falls Portage National Historic Landmark – 4(f) property
- Missouri River
- Sand Coulee Creek
- Farmland

Probable future permits and/or actions based on the environmental scan include, but not limited to, and may require mitigation:

- Floodplain permit
- Biological survey/Wetland Determination and Delineation
- Cultural Resource survey
- Noise analysis
- Air Quality (Mobile Source Air Toxics Evaluation)
- Hazardous Waste Site Evaluation
- Clean Water Act Section 404 Permit (from the US Army Corps of Engineers)
- Stream Protection Act 124 Notification (from MT Department of Fish, Wildlife and Parks)
- Coordination with the Natural Resources Conservation Service (farmland conversion impact rating form)
- Coordination with the United States Fish and Wildlife Service

For detailed information regarding any of these elements, the Environmental Scan Report is contained in Appendix 6D."

6.5 Utilities

The following GIS-based utility information was reviewed in the study corridor:

- Electricity
- Public water supplies
- Waste water
- Telecommunications

Existing Great Falls South Arterial Corridor

Utilities in the Great Falls South Arterial Corridor area include electricity, public water supplies, waste water, and telecommunications. A summary of utilities identified from GIS-based information in the existing Great Falls South Arterial Corridor is presented in Table 4. Because of their abundance, public water supplies were not summarized individually in the table.

Numerous public water supplies exist in the project area. See Appendix 6H for a list of public water supplies located in Cascade County. Petroleum pipelines and mine sites also exist in the Great Falls South Arterial Corridor project area.

Table 4. Utilities in the Great Falls South Arterial Corridor

Utility	Location
Electricity	Electrical utility services are provided throughout the project area.
Waste water	Waste-water services are provided throughout the project area.
Telecommunications	Service in the project area is provided by a network of aerial and buried cables.

7. ALIGNMENT ANALYSIS

The planning-level analysis conducted for this study allows for the identification, selection, and elimination of potential alignments, but lacks the precision to identify the specific properties or other features impacted. The proposed alignments were screened and one identified as the recommended alignment based on the best available data and mapping through February, 2008. Additional detailed and specific environmental analysis and design will be conducted, including the identification of specifically impacted properties and possible mitigation measures if a project is advanced from this study.

The Montana Department of Transportation, City of Great Falls, Cascade County and Federal Highway Administration refined thousands of alignments produced by the Quantm software program into five optimized alignments. These alignments were presented to the public and resource agencies. Based on resource agency concerns regarding protected properties under Section 4(f) of the Transportation Act, a sixth alignment (the Purple Alignment), swinging to the south edge of the corridor, as shown in Appendix 7A) was added as an option that would totally avoid the Great Falls Portage National Historic Landmark. These six alignments were carried forward for review under this planning-level analysis (Figure 5).

Although the Purple Alignment avoids the use of Section 4(f) resources, it is not considered prudent to carry this alignment forward to the environmental review process. The Purple Alignment was rejected due to adverse impacts to floodplains and property, extraordinary cost, and ability to meet purpose and need as detailed in Section 7.2 of this study.

Based on the documented analysis, it is proposed that the Red Alignment be advanced as the ***recommended alignment*** (Figure 6) for consideration in the NEPA/MEPA environmental review process. In an effort to clearly illustrate how this recommendation was made, the six tables below were prepared to show how the other five alignments, shown in Figure 5 compare to the Red Alignment. This information demonstrates that the Red Alignment minimizes impacts to Section 4(f) resources and is least costly compared to the other alignments.

Insert Figure 5 – Optimized Alignments

Insert Figure 6 – Recommended Alignment

7.1 Analysis Criteria

Based on a planning-level overview of natural resources in the study area[8] it was determined that the six proposed alignments could possibly impact at least four areas of concern under the National Environmental Policy Act (NEPA) and the Montana Environmental Policy Act (MEPA), thus requiring additional analysis. The areas were Section 4(f) properties, wetlands, floodplains, and rights-of-way (this includes both private-land impacts and possible relocations). There are other areas that will need to be analyzed through the future NEPA/MEPA environmental analysis process. However, these other areas did not rise to a level of concern that would require additional consideration during this planning-level analysis.

All alignment impacts are estimates and stated in general terms. This allows for minor shifts in the selected alignment during final design to further lessen impacts on any features or properties. Although the final design may include a two-way facility with a slower traveling speed, this analysis was based on a four-lane rural principal arterial with limited access control, including turning lanes at access points, and a design speed of 60 mph to consider the greatest potential impact. Analyzing the greatest potential impact area will help facilitate the ability to phase construction by building a two-lane facility and protecting right-of-way for a future four-lane facility.

Bridges are typically designed for a 75-year life. Predicting traffic volumes out 75 years with any accuracy is not realistic. The staff recommendation during the design phase is to look at a four-lane structure or a two-lane structure that can easily be expanded for additional lane widths. Given the Clean Water Act 404 permitting process requirements for the project sponsor to minimize impacts, it is difficult to predict these requirements for the construction of two side-by-side structures separated by a length of time as laws and rules change. Options for final bridge design will be developed when a project is forwarded.

Using these described criteria, the following analysis was conducted:

7.2 Section 4(f) Properties

Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 USC 303) protects the use of land from a significant publicly owned public park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless the following determinations are made:

- There is no feasible and prudent alternative to the use of land from the property; and
- The action includes all possible planning to minimize harm to the property resulting from such use.

Prior to approving a project that uses a Section 4(f) resource, FHWA must find that there is no prudent or feasible alternative that completely avoids 4(f) resources. The Great Falls Portage National Historic Landmark is a large 4(f) resource that extends through the middle of the study area. The Quantm tool was used to generate alignments that completely avoid 4(f) resources. From the alignments generated, the Purple Alignment was selected and optimized for

[8] All alignment impacts are estimates and stated in general terms based on the best available data and mapping through February 8, 2008. This allows for minor shifts in the selected alignment during final design to further lessen impacts on any features or properties.

consideration in the detailed alignment analysis along with the original five alignments that cross the National Historic Landmark. Based on the information in Table 5, the Purple Alignment is

the only route with no 4(f) use. Under section 4(f), if there is a feasible and prudent alternative that avoids the use of a 4(f) resource among alternatives that use a 4(f) resource, the avoidance alternative must be selected.

An alternative may be rejected as not prudent for any of the following reasons:

- It does not meet the project purpose and need.
- It involves extraordinary operational or safety problems.
- There are unique problems or truly unusual factors present with it.
- It results in unacceptable and severe adverse social, economic, or other environmental impacts.
- It would cause extraordinary community disruption.
- It has additional construction costs of an extraordinary magnitude.
- There is an accumulation of factors that collectively, rather than individually, have adverse impacts that present unique problems or reach extraordinary magnitudes.

Although the Purple Alignment avoids the use of 4(f) resources, the alignment was rejected based on adverse impacts to property and floodplains, extraordinary cost, and inability to meet goals and objectives. Compared to the other five alignments, the Purple Alignment:

- Impacts nearly twice as many floodplain acres,
- Impacts 17-30% more right-of-way acres,
- Impacts nearly twice as many parcels with structures,
- Costs 70-95% more ,
- Generates 50-60% less travel demand between Fox Farm Road and US 87/89 due to its long length with 50% less traffic relief on other key network links, and
- Impacts the viewshed south from the National Historic Landmark.

It is not considered prudent to carry the Purple Alignment forward based on purpose and need along with extraordinary difference in impacts and costs.

Of those alignments that cross the National Historic Landmark the Green and Yellow Alignments have the greatest impact on Section 4(f) properties. Minimizing impacts to this protected property is one that uses the existing 33rd Avenue South/Gibson Flats Road Corridor, which currently bisect the Landmark. As illustrated in Table 5, the proposed Red Alignment best maximizes the use of this option, resulting in the fewest number of acres in the National Historic Landmark being impacted. The strategy of incorporating existing roadways and rights-of-ways in each alignment may further lessen the "use" of, or impact to, the National Historic Landmark.

Table 5. Section 4(f) Impact Analysis

Alignment Color	Acres Impacted	Difference from Red Alignment (Acres)
Purple	0	-
Red	34	0
Aqua	37	3
Blue	40	6
Green	48	14
Yellow	63	29

7.3 Wetlands

Wetland impacts are governed by Section 404 of the Federal Clean Water Act. The assumption is that all wetlands could be jurisdictional for this evaluation. When a project is forwarded, additional design for avoidance and minimization will be completed, which may reduce impacts to wetlands. This Alignment Study understands that unavoidable impacts must be mitigated. The mitigation plan will be developed when a project is forwarded.

This evaluation only looks at total differences of conservative assumptions. Wetlands were not formally delineated for this study. The wetland identification was made using aerial photos and a field review which looked at vegetation, land characteristics, and made assumptions near waterways. When a project is forwarded, wetlands that may be impacted will be delineated according to United States Army Corps of Engineers procedures.

Although the Yellow Alignment would impact the least amount of wetlands, the differences in the number of wetland acres impacted by the first four alignments as listed in Table 6 below, which includes the Red Alignment, are negligible. This may be due, in part, to the conservative method used to determine wetlands. The Aqua and Blue Alignments have the greatest impact on wetlands.

Table 6. Wetland Impact Analysis

Alignment Color	Acres Impacted	Difference from Red Alignment(Acres)
Yellow	9	-2
Red	11	0
Green	11	0
Purple	12	+1
Aqua	16	+5
Blue	16	+5

7.4 Floodplains

FHWA has set forth policies and procedures for the location and hydraulic design of highway encroachments on floodplains. The FHWA polices are:

- To encourage a broad and unified effort to prevent uneconomic, hazardous, or incompatible use and development of the nation's floodplains.

- To avoid longitudinal encroachment where practicable.
- To avoid significant encroachment where practicable.
- To minimize impact of highway agency actions that adversely affect base floodplains.
- To restore and preserve the natural and beneficial floodplain values that are adversely impacted by highway agency actions.
- To avoid support of incompatible floodplain development.
- To be consistent with the intent of the Standards and Criteria of the National Flood Insurance Program where appropriate.
- To incorporate "A Unified National Program for Floodplain Management" of the Water Resources Council into FHWA procedures.

The six alignments were reviewed to determine impacts to identified floodplain areas. The number of acres impacted by each alignment is presented in Table 7 below. The Green Alignment is the least impactive to floodplain areas, while the Purple Alignment impacts nearly twice as many acres as any of the other alignments. The results of this evaluation alone would not eliminate any of the alignments.

Table 7. Floodplain Impact Analysis

Alignment Color	Acres Impacted	Difference from Red Alignment (Acres)
Green	46	-9
Aqua	54	-1
Blue	54	-1
Red	55	0
Yellow	56	+1
Purple	91	+36

Additionally, impacts can be further mitigated by designing roadways and structures to prevent additional flooding or to minimize increases in floodwater elevations.

7.5. Right-of-Way

When using federal funds, a project sponsor must look at impacts to private property. Under each alignment, additional right-of-way would need to be acquired to accommodate any new alignment and/or roadway widening. In some cases, right-of-way acquisitions may require relocating homes, outbuildings, and/or utility structures and reconfiguring urban layout and connectivity. The amount of new right-of-way purchased and impacts to individual residences were minimized where possible.

As federal funds may be used for the acquisition of right-of-way, the acquisition process will comply with state and federal statues governing right-of-way appraisal, acquisition, and relocation assistance (Title 31, Montana Code Annotated (MCA), Chapter 31, Relocation Assistance Fair Treatment of Condemness and Title 49, Code of Federal Regulations (CFR), Part 24, Uniform Relocation Assistance and Real Property Acquisition Regulations for Federally Assisted Programs). Utility relocations will require coordination with local utility companies.

Understanding that these right-of-way acquisition needs are based on planning-level estimates, additional avoidance or minimization measures may be possible during design. As presented in

Table 8 below, it appears the Green, Aqua, and Red Alignments would impact the least number of acres. Additionally, as presented in Table 9 below, the Green, Yellow and Red Alignments would impact the least number of parcels with structures.

Table 8. Right-of-Way Impact Analysis (Total Acres Impacted)

Alignment Color	Acres Impacted	Difference from Red Alignment (Acres)
Green	214	-4
Aqua	215	-3
Red	218	0
Yellow	232	14
Blue	241	23
Purple	282	64

Table 9. Right-of-Way Impact Analysis (Parcels With Structures)

Alignment Color	Parcels Affected	Difference from Red Alignment (Parcels)
Green	≈ 26	-5
Yellow	≈ 27	-4
Red	≈ 31	0
Blue	≈ 38	+7
Aqua	≈ 52	+21
Purple	≈ 56	+25

7.6. Cost Estimates

The estimated costs for each alignment are based on construction, design, right-of-way, utilities, and other miscellaneous costs. These are estimated using 2035 dollars for a comparison. Actual costs may increase in the future due to inflation, material costs, and other unknowns. As this is a planning study, these estimated costs can be reviewed and used to determine which alternatives to advance. Based on the information presented in Table 10 below, the Red Alignment is the least costly.

Table 10. Cost Estimates[1]

Alignment Color	Cost (In Millions)	Difference from Red Alignment
Red	$275	$ 0
Green	$301	$ 26
Aqua	$311	$ 36
Yellow	$323	$ 48
Blue	$323	$ 48
Purple	$540	$265

[1] Estimated cost includes inflationary factor and indirect costs for year 2035, using Global Insights Project Cost Inflation Calculator and a 3% annual inflation rate. Also includes the following: construction, right-of-way, structures, mitigation, a new interchange at I-15 on Gore Hill, design, utilities, and other miscellaneous charges.

7.7. Summary

The Purple Alignment has the least impact on Section 4(f) properties. By using the existing 33rd Avenue South/Gibson Flats Road corridor that bisects the National Historic Landmark, the Red Alignment has the next fewest impacts on Section 4(f) properties. When the analyses of the other criteria are factored into the equation, the Purple Alignment has an extraordinary difference in impacts to developed parcels, right-of-way acquisition, and cost as demonstrated by the analysis and summarized in Table 11. In addition, it impacts the viewshed south from the National Historic Landmark. And, most notably, the Purple Alignment does not meet the goals and objectives of this study. It would not be considered prudent to carry the Purple Alignment forward to further analysis based on impacts and costs.

Of the remaining five alignments, impacts are similar except that the Red Alignment is the least impactive to 4(f) properties and the least costly. Although the Green Alignment appears to have similar impacts as the Red Alignment, it impacts over 40% more acres of the National Historic Landmark than the Red Alignment. Based on this analysis, the Red Alignment is proposed as the ***recommended alignment*** for consideration in the formal NEPA/MEPA environmental review process.

Table 11. Alignment Analysis Summary

Range	4(f) Acres Impacted 0-63 Acres	Wetland Acres Impacted 9-16 Acres	Floodplain Acres Impacted 46-91 Acres	Parcels with Structures 26-56 Parcels	RW Acres Impacted 214-282 Acres	Cost (in millions) $275-$540
Purple	*	▲▲	▲▲	▲▲	▲▲	▲▲
Aqua	►	▲▲	►	▲▲	►	▲▲
Blue	►	▲▲	►	▲▲	▲▲	▲▲
Green	▲▲	▲▲	▼	▼	▼	►
Red	▼	▲▲	►	►	►	▼
Yellow	▲▲	▼	▲▲	►	►	▲▲

* No Impacts

▼ Least Impactive

► Impacts within 20% of least impactive alignment if impact is <100, within 10% if impact is >100

▲▲ Greatest Impact - beyond 20% of least impactive alignment if impact is <100, beyond 10% if impact is >100

8. TRAVEL DEMAND FORECASTING

8.1 Background

8.1.1. Introduction

The traffic model used for this study was developed by the Montana Department of Transportation in support of the *2003 Great Falls Area Transportation Plan*. The model used to predict future traffic conditions for the plan was based on the existing Great Falls transportation network and committed system improvements. Future land use was projected by the local government as part of the transportation plan. Typically, a 20-year horizon is chosen as the target year for projections. This process predicted population, housing, and employment growth trends out to 2025. Utilizing socioeconomic growth projections, the existing road network and committed improvements, the travel demand model forecasts 2025 traffic volumes.

The future year (2025) traffic model analyzed the effects on the transportation system from the South Arterial and its potential alignments. For the purposes of this report, primarily the transportation system impacts from the recommended alignment are presented here. Impacts to the system from the full arterial along with its individual segments were analyzed.

8.1.2. Review of 2004 Great Falls Arterial Feasibility Study

The traffic model was one of the tools used to assess the impacts of a South Arterial for the *2004 Great Falls Arterial Feasibility Study*. Analysis of 2025 model runs in the study showed a new South Arterial would provide connectivity between major north-south links and satisfy the demand for east-west travel lacking in the existing transportation network. This was illustrated by the traffic volumes carried by the South Arterial. Model volumes ranged from approximately 5,000 to 13,000 vehicles per day (vpd).

Total vehicle miles of travel (VMT) and vehicle hours of travel (VHT) from model runs are an indication of the operational efficiency of the transportation network. They are useful to analyze the effects transportation improvements might have upon the network. VMT and VHT were compared with and without the South Arterial. With the arterial, both VMT and VHT decreased systemwide. VMT decreased 2 percent, and VHT decreased by 3.3 percent, indicating the road network is more efficient with the arterial.

Review of future year (2025) model runs indicated additional benefits from a South Arterial. There were significant reductions in traffic volumes on the 10th Avenue South corridor and Fox Farm Road. The *2003 Great Falls Area Transportation Plan Update* indicates many intersections on 10th Avenue South and on Fox Farm Road are projected to have unacceptable levels of service (LOS) under 2025 peak-hour traffic conditions. The reduction in traffic volumes as a result of the South Arterial would ease the congestion predicted for the future.

8.2. Analysis

8.2.1. Current Conditions

A list of current traffic counts on key roadways influenced by the South Arterial, are included in Appendix 8A**.**

8.2.2. Full Arterial

The traffic model was upgraded with information developed for this Alignment Study, including aligning the modeled arterial generally along the route identified as the recommended

alternative. Once a recommended alignment for the arterial was identified through Quantm software, the correct alignment was reflected in model runs. Also, utilizing growth rates, the time frame for the model exercise was extended to 2035 for this study.

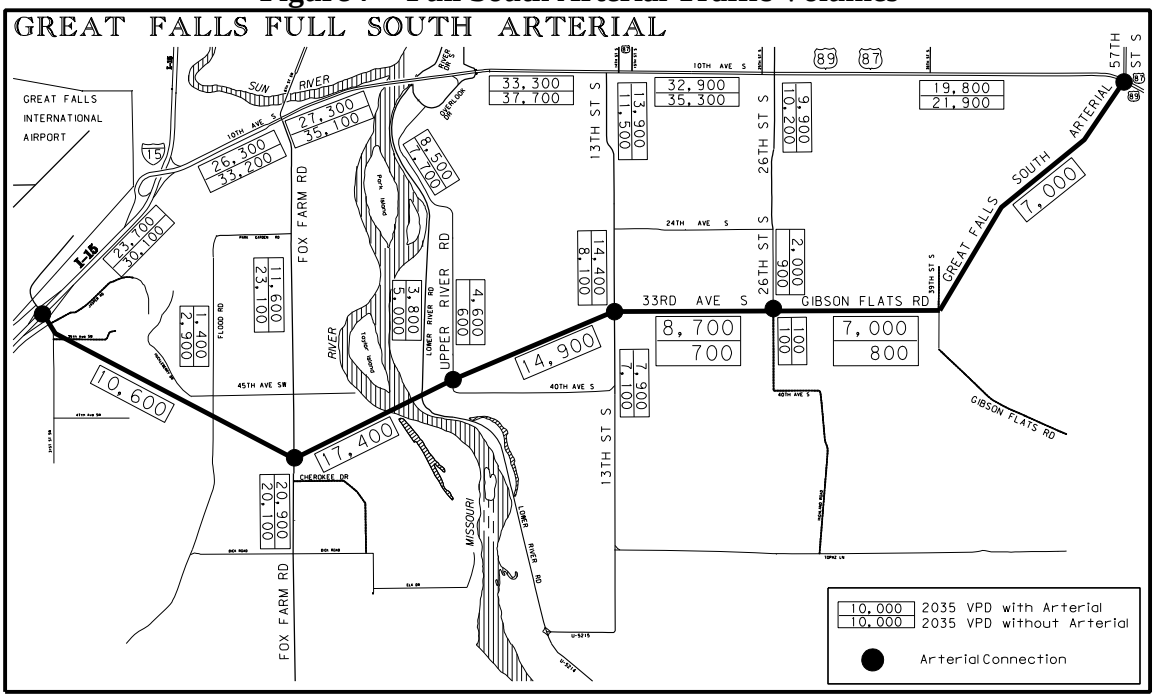
Initial model runs on the full South Arterial assumed a limited-access facility with connections at major road crossings to the junction with 13th Street South. At 13th Street South, the arterial would utilize existing roadway. It would follow 33rd Avenue South and Gibson Flats Road to the point where Gibson Flats Road turns south. At that point, the arterial would resume a limited-access nature to its termination at US 87/89. The arterial would connect to the road network at Fox Farm Road, Upper River Road, 13th Street South, and 26th Street South, with end points near the Gore Hill Interchange and on US 87/89 near 57th Street South. Results from model runs with the full arterial are shown in Table 12 and Figure 7.

Table 12. Full Arterial Traffic Volumes

Roadway	Segment	2035 Traffic Volumes
Great Falls South Arterial	I-15–Fox Farm Road	10,000–11,000 vpd
	Fox Farm Road–Upper River Road	17,000–18,000 vpd
	Upper River Road–13th Street South	14,000–15,000 vpd
	13th Street South–26th Street South	8,000–9,000 vpd
	26th Street South–US 87/89	6,000–7,000 vpd
10th Avenue South	I-15–Fox Farm Road	21% decrease
	Fox Farm Road–River Drive South	22% decrease
	River Drive South–13th Street South	12% decrease
	13th Street South–26th Street South	7% decrease
	26th Street South–57th Street South	10% decrease
Flood Road	North of 45th Avenue SW	52% decrease
Fox Farm Road	North of 45th Avenue SW	52% decrease
	South of Cherokee Drive	6% increase
Upper River Road	South of Overlook Drive	10% increase
Lower River Road	South of 10th Avenue South	24% decrease
13th Street South	North of 33rd Avenue South	50% increase
	South of 33rd Avenue South	11% increase
26th Street South	South of 10th Avenue South	3% decrease
	South of 24th Avenue South	120% increase*
	South of 33rd Avenue South	no change

*Note that the increase is from less than 1,000 vpd to less than 1,200 vpd; which is an insignificant change in traffic volumes for this roadway segment.

Figure 7 – Full South Arterial Traffic Volumes



Review of the 2035 traffic volumes shows the arterial would carry 6,000 to 18,000 vehicles per day. The most heavily used section would be Fox Farm Road to 13th Street South, which would carry 14,000 to 18,000 vehicles per day. As in the *Great Falls Arterial Feasibility Study*, this analysis shows beneficial reductions in traffic on the entire 10th Avenue South corridor and on Fox Farm Road north of 45th Avenue with the arterial versus without. The reductions in traffic volumes should increase the level of service on these facilities. Flood Road and Lower River Road would also see a reduction in traffic volumes. A portion of 13th Street South would experience large increases in traffic with the arterial. The increase could be large enough to degrade the level of service. The other roadways shown above would experience a slight increase in traffic, but should not have a decrease in level of service due to projected volumes of less than 10,000 vpd on those links. Although a 120 percent increase is predicted for a portion of 26th Street South, it should be noted that the future volume without the South Arterial is less than 1,000 vpd, so impacts from this increase would be negligible. The South Arterial would have little impact on the rest of the major street network. To review the complete model analysis, refer to Appendix 8B.

VMT and VHT from model runs were compared with and without the arterial. With the arterial, VMT decreased 2 percent and VHT decreased 3.3 percent system wide. This indicates the road network would be more efficient with the arterial.

The ratio of volume to capacity on a roadway can be used to calculate the level of service of that roadway. The results of the calculation are usually translated into a grading system that ranges from LOS A to LOS F. LOS A indicates smooth operation with no congestion, and LOS F indicates oversaturation and results in gridlock. The interim letters, B through E indicate an intermediate condition. Level of service calculations on the South Arterial from Fox Farm Road to 13th Street South translate to LOS E and F if built as a two-lane facility. Consequently, a four-lane is likely for this segment.

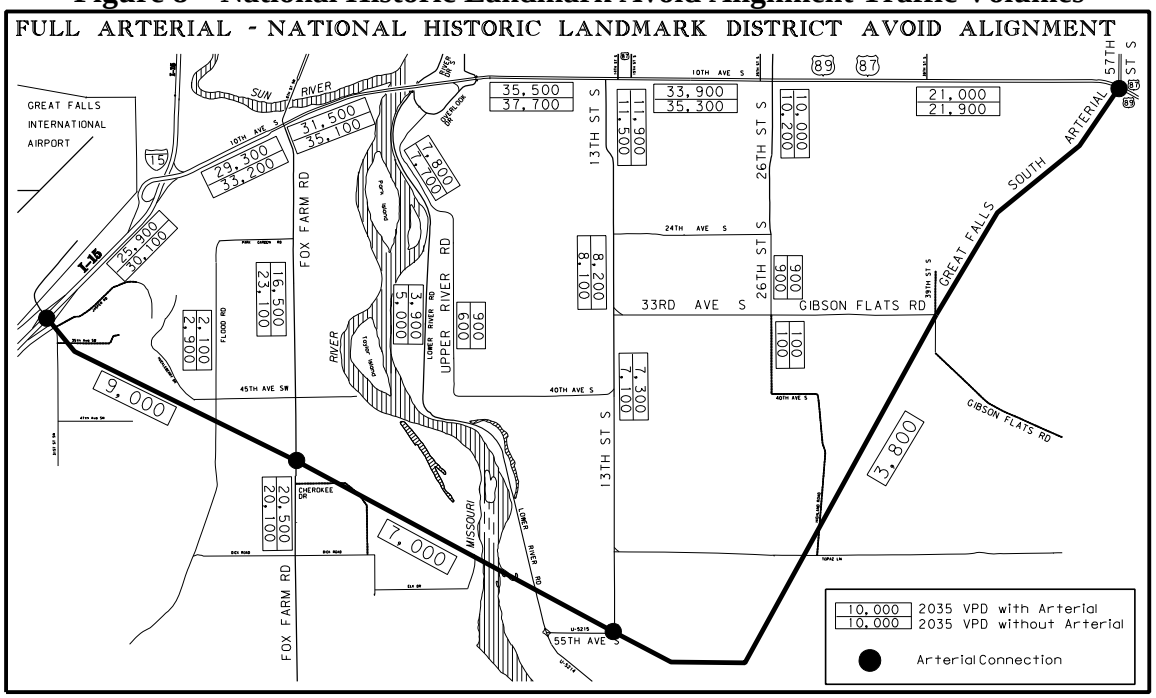
8.2.3. Full Arterial – National Historic Landmark Avoid Alignment

A model analysis was completed on a full South Arterial alignment which completely avoided the National Historic Landmark (NHL). For this model run, the arterial connects to the street network at Fox Farm Road and 13th Street South, while the endpoints remained identical to the recommended full arterial. The number of possible street connections were limited by the southern location of this alignment. The results of the model run are shown in Table 13 and Figure 8.

Table 13. NHL Avoid Alignment Traffic Volumes

Roadway	Segment	2035 Traffic Volumes
Great Falls South Arterial	I-15–Fox Farm Road	9,000-10,000 vpd
	Fox Farm Road-13th Street South	6,000-7,000 vpd
	13th Street South-US 87/89	3,000-4,000 vpd

Figure 8 – National Historic Landmark Avoid Alignment Traffic Volumes



Traffic volumes from the NHL avoid alignment model run show the I-15 to Fox Farm Road segment would carry almost as much traffic volume as that segment from the recommended full arterial. This segment of the avoid alignment closely follows the recommended alignment with similar travel times. At Fox Farm Road the avoid alignment departs to the south to avoid the NHL. Due to the extended travel times and lack of road network connections, traffic volumes on the avoid alignment between Fox Farm Road and US 87/89 drop. This portion of the arterial would carry 3,000 to 7,000 vehicles per day versus 6,000 to 18,000 vehicles per day for the

recommended full arterial alignment. As traffic volumes on the avoid alignment decline, so do the beneficial reductions in traffic on 10th Avenue South and Fox Farm Road from a South Arterial. The decreases in traffic on 10th Avenue South and Fox Farm Road from the arterial are approximately half the decreases with the recommended full arterial alignment. Flood Road and Lower River Road would also see reductions in traffic with the avoid alignment. There was no change in traffic on Upper River Road, 13th Street South and 26th Street South. To review the complete model analysis, refer to Appendix 8C.

8.2.4. Segments

The traffic model was used to analyze the effects to the road network from independent segments of the South Arterial. Table 14 contains traffic volumes for individual, stand alone segments.

Table 14. Arterial Segment Traffic Volumes

Roadway	Segment	2035 Traffic Volumes
Great Falls South Arterial	I-15–Fox Farm Road	7,000–8,000 vpd
	Fox Farm Road–Upper River Road	11,000–12,000 vpd
	Upper River Road–13th Street South	less than 1,000 vpd
	13th Street South–26th Street South	less than 1,000 vpd
	26th Street South–US 87/89	1,000–2,000 vpd
	Fox Farm Road–13th Street South*	10,000–13,000 vpd

*Traffic volume on partial segment

The traffic volumes shown above represent results when each separate segment of the arterial was modeled as a stand-alone section and as a partial arterial segment. The results illustrate the Fox Farm Road to Upper River Road segment would carry the most traffic if built independent of the other sections of the arterial. The I-15 to Fox Farm Road segment would also carry a fairly heavy volume of traffic. The other segments generate minimal traffic when operated independently. The Fox Farm Road to 13th Street South segment would offer the greatest independent utility, illustrated by the range of traffic volumes it would carry (10,000 – 13,000 vpd).

8.2.5. Partial South Arterial

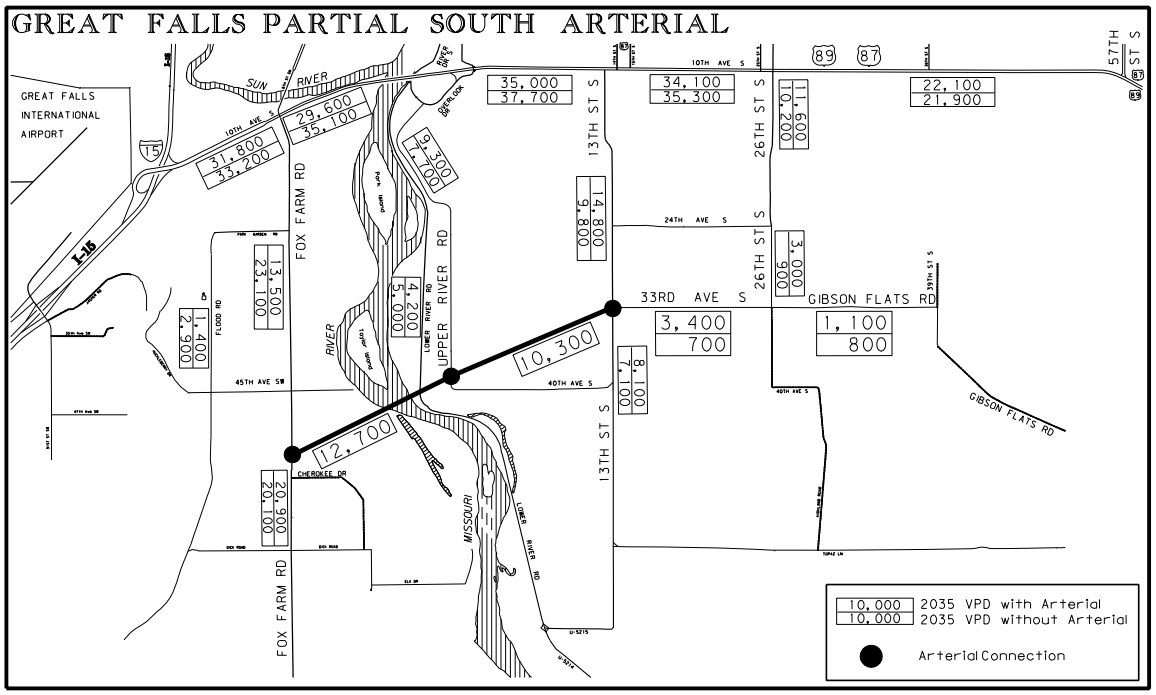
Funding limitations may necessitate the South Arterial be constructed in shorter segments of independent utility with logical termini. The first independent segment recommended for construction is Fox Farm Road to 13th Street South. The traffic model was used to examine the effects to the road network with this segment of the South Arterial. The traffic volumes on arterial segments and other impacted roadways are shown in Table 15 and in Figure 9.

Table 15. Partial Arterial Traffic Volumes

Roadway	Segment	2035 Traffic Volumes
Great Falls South Arterial	Fox Farm Road–Upper River Road	12,000–13,000 vpd
	Upper River Road–13th Street South	10,000–11,000 vpd
10th Avenue South	I-15–Fox Farm Road	4% decrease
	Fox Farm Road–River Drive South	16% decrease
	River Drive South–13th Street South	7% decrease
	13th Street South–26th Street South	3% decrease
	26th Street South–57th Street South	1% decrease
Flood Road	North of 45th Avenue SW	52% decrease
Fox Farm Road	North of 45th Avenue SW	43% decrease
	South of Cherokee Drive	4% increase
Upper River Road	South of Overlook Drive	21% increase
Lower River Road	South of 10th Avenue South	16% decrease
13th Street South	North of 33rd Avenue South	56% increase
	South of 33rd Avenue South	14% increase
26th Street South	South of 10th Avenue South	14% decrease
	South of 24th Avenue South	233% increase*
	South of 33rd Avenue South	no change

*Note that the increase is from less than 1,000 vpd to less than 1,200 vpd; which is an insignificant change in traffic volumes for this roadway segment.

Figure 9 – Partial South Arterial Traffic Volumes



Review of traffic volumes with a section of the arterial from Fox Farm Road to 13th Street South shows the partial arterial would carry 10,000 to 13,000 vehicles per day. This would reduce volumes on 10th Avenue South, although not to the same degree as the full arterial. The decrease in traffic volume on Fox Farm Road is almost the same as with the full arterial and there would be an increase in the level of service. A partial arterial would decrease traffic on Flood Road and Lower River Road. Also, there would be increases in traffic on Upper River Road and 26th Street South. The increases on these roadways should not be large enough to cause a decrease in the level of service. Although an increase of 230 percent is predicted for a portion of 26th Street South, it should be noted that the future volume without the arterial is less than 1,000 vpd; therefore, impacts from this increase would be minimal. The traffic increases on 13th Street South would be large enough to degrade the level of service. The partial arterial would have little impact on the rest of the major street network. To review the complete model analysis, refer to Appendix 8D.

VMT and VHT from model runs were compared with and without the partial arterial. With the partial arterial, VMT decreased 1.6 percent and VHT decreased 0.4 percent system wide. This indicates the road network operates more efficiently with the partial arterial, although benefits are not as great as with the full arterial.

Calculating the volume-to-capacity ratio on the Fox Farm Road to Upper River Road segment of the partial arterial yields a value of approximately 0.85. That value translates to a LOS D. This level of service is indicative of a roadway nearing capacity and congestion could be expected. The segment of the partial arterial from Upper River Road to 13th Street South would operate at a mid-range LOS C. A four-lane is likely for the first segment of the partial arterial. If built as a four-lane, the partial arterial would operate in the LOS A to B range with smooth operation and no congestion.

8.2.6. Accident Analysis

Crash data for the 10th Avenue South Corridor (57th Street South to Fox Farm Road) from January 1, 2005, through December 31, 2007, was considered. Two ways to interpret crash data for comparison purposes to statewide averages are crash rates and severity indices. Crash rates are defined as the number of crashes per million vehicle-miles. Severity indices are somewhat more complicated, but are weighted ratios relating the seriousness of the injuries in a crash to the total number of crashes. Covering the latest three-year period, the crash rate on the 10th Avenue South corridor is 6.10 and the severity index is 1.62. These compare to corresponding statewide averages for similar roadways within city limits of 5.66 and 1.67. For the latest three-year time period, the 10th Avenue South corridor has had a slightly higher crash rate and slightly lower severity index than the statewide averages. There were a total of 271 injury crashes of various types out of a total of 992 crashes.

In the *2004 Great Falls Arterial Feasibility Study*, crash projections were made based on traffic volume forecasts from model runs. The *2004 Great Falls Arterial Feasibility Study* predicted a system-wide reduction in all types of crashes with a southern arterial. The proposed reduction in crash potential was based on traffic-model-projected decreases in traffic volumes on key links within the transportation system. Following the same reasoning with updated model runs and corresponding decreases in volumes on major links, an overall reduction in crash potential might be expected, especially with the full arterial.

9. PURPOSE AND NEED

The *Great Falls South Arterial Alignment Study* is an extension of the *Great Falls Growth Policy* (2005), *Great Falls Area Transportation Plan* (2003), and the *Great Falls Arterial Feasibility Study* (2004). This alignment study is a refinement of the southern corridor four-lane urban arterial recommended in the *Great Falls Arterial Feasibility Study*.

The purpose and need developed from this study must be consistent with the goals, objectives, and policies as set forth in the growth policy and transportation plan. It must also be consistent with the benefits presented in the *2004 Great Falls Arterial Feasibility Study*. The working group, with input from the public and stakeholders, reviewed and expanded upon the information presented in these documents to develop the purpose and need statement in this study.

The purpose and need identified in this study will be used as part of the overall project development process consistent with the National Environmental Policy Act and the Montana Environmental Policy Act (NEPA/MEPA).

In the development of a purpose statement, the needs or issues that will be addressed by a project must be determined if it is to be advanced through the project development process. Based on the information contained in the previously noted studies and plans and information gathered from the public and stakeholders, the following needs were identified that would be met or improved upon from development of the South Arterial:

- Reduce congestion on the 10th Avenue South corridor.
- Improve safety on the 10th Avenue South corridor.
- Improve mobility on the Great Falls street network.
- Provide an additional Missouri River bridge crossing, south of 10th Avenue South.

There would also be other benefits when the entire arterial is developed. These would include:

- Improving air quality by reducing congestion and stopping and idling times;
- Improving an international and regional trade corridor and reducing travel time between the area's two military operations;
- Reducing emergency response times to and from the southwest Great Falls area and providing an additional emergency egress in case of disaster.

Using the above identified needs and benefits, the following purpose statement was derived from this study: ***The purpose of the proposed project is to reduce congestion and improve safety on the 10th Avenue South corridor, improve street network mobility, and provide an additional Missouri River bridge crossing, south of 10th Avenue South.***

10. FINANCIAL ANALYSIS

The financial feasibility of the South Arterial was considered in the *2004 Great Falls Arterial Feasibility Study.* Although a new arterial was demonstrated to meet the economic benefit/cost threshold, the study concluded that funding for this project will continue to be a challenge. The ability of this project to be funded for continued development, including final design, right-of-way acquisition, and construction is a function of the availability of existing and future federal, state, local, and private funding sources. Due to the tremendous costs anticipated for right-of-way acquisition and construction of a new South Arterial, the project is generally considered to be beyond the ability of the participating agencies to fund through existing funding avenues. As such, special congressional appropriations, coupled with funds from the State of Montana, Cascade County, City of Great Falls, and private development, as opportunities arise, are anticipated to be the best means by which to continue the development of this project.

A summary of the planning requirements and listing of the potential funding sources that may be utilized to advance this project are discussed herein. The list should not be considered inclusive, nor should the program funds listed be considered readily available.

10.1 Planning Requirements

As defined in federal regulations, the South Arterial is a "regionally significant project" located within the Great Falls Metropolitan Planning Area (Figure 10).

Federal regulations require that to achieve federal approval of the environmental document for regionally significant projects within a metropolitan planning area (MPO) (or independent segments of larger projects), the project must be included in these financially constrained[8] documents:

- MPO long-range transportation plan
- MPO Transportation Improvement Program (TIP)
- State Transportation Improvement Program (STIP)

Federal regulations allow larger projects, such as the South Arterial, to be divided into smaller independent segments, but each must have independent utility and logical termini while still contributing to the function of the overall project. The long-range transportation plan must demonstrate that revenues are reasonably expected to be available and sufficient to cover the cost of the entire project or independent segments of a larger project. Regarding the TIP/STIP, if construction is beyond the time frame of these documents, then funding for at least one subsequent project phase (i.e., final design, right-of-way, utility relocation, or construction) must be reflected in these documents to achieve FHWA approval of the environmental document.

The South Arterial is not in Great Falls' current TIP (2007-2011) and would need to be included in the fiscally-constrained *Great Falls Area Transportation Plan* prior to inclusion in the TIP. Although the latest *2003 Great Falls Area Transportation Plan* included the South Arterial as an "illustrative project,"[9] it is important that a financial plan for constructing at least an independent segment of the South Arterial is included in the update of the fiscally constrained *Great Falls Area Transportation Plan* with inclusion of a subsequent phase(s) (i.e., final design, right-of-way, utility relocation, or construction) in the TIP and STIP following the plan update.

[8] *Financially constrained* is a demonstration of sufficient funds (federal, state, local, and private) to implement proposed transportation system improvements, as well as to operate and maintain the entire system through the comparison of revenues and costs (23 CFR 450.104).

[9] *Illustrative project* means that no specific or guaranteed funding source has been identified at this time.

Insert Figure 10 – Great Falls Metropolitan Planning Area

The *Great Falls Area Transportation Plan* update is scheduled for completion in 2009. During this long-range transportation planning process, this project should be weighed against other projects competing for available area funding to develop a fiscally constrained plan. All projects in the process are evaluated to determine the optimum mixture that best meets the development of an integrated multimodal transportation system to facilitate the safe and efficient movement of people and goods. If the South Arterial or smaller segment with independent utility and logical termini is included in the fiscally constrained conforming transportation plan and a subsequent phase in the TIP, the FHWA could sign an environmental decision document (ie: A Finding of no Significant Impacts or a Record of Decision) for this project. Conversely, if it is not in such plans, then FHWA could not sign an environmental decision document advancing a build alternative. FHWA could either delay issuance of an environmental document until the long-range plan and TIP include the project or could select the No-Action Alternative. In addition, the preservation of corridors within metropolitan areas is not eligible for federal-aid funds if the construction project within the preserved corridor cannot be completed within the planning horizon.

10.2 Potential Funding Sources

10.2.1 Federal Funding

Federal funding for highway construction is supported by the Federal Highway Trust Fund and generally comes from a congressional transportation-spending bill that is reauthorized every six years. The most recent surface-transportation-spending bill, the "Safe Accountable Flexible and Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU) enacted on August 10, 2005, provides transportation funding through September 30, 2009. Continued federal funding is subject to a future reauthorization of SAFETEA-LU by Congress.

Currently available funds for the South Arterial were provided through SAFETEA-LU, which earmarked funds for 33 Montana projects, including $4,500,000 for the *Great Falls South Arterial Development.* The Montana Department of Transportation is providing the required 13.42 percent matching funds for this earmark based on Montana Transportation Commission approval at its November 1, 2005, meeting. The estimated total available for this project, including match, is $5,197,500. A portion of the earmarked and state matching funds has been used for this alignment study with the majority of the funds remaining for development of the environmental document, project design, and (based on availability) future right-of-way acquisitions.

The *2004 Great Falls Arterial Feasibility Study* discussed potential federal funding sources as listed in Table 12. The most recent status of these federal sources and eligibility criteria, as related to the South Arterial, are reflected.

Table 16. Status of Potential Federal Funding Sources Identified in the 2004 *Great Falls Arterial Feasibility Study*

Federal Sources	Status	Eligibility
National Corridor Planning & Development Program (NCPD)	Inactive	N/A
Coordinated Border Infrastructure Program (CBI)	Active	No[1]
Congestion Mitigation & Air Quality Improvement Program (CMAQ)	Active	Yes
Transportation Community and System Preservation Program (TCSP)	Active	Yes
National Highway System (NHS)	Active	No[2]
Congressional Appropriations	Active	Yes

1. Projects must be within 100 miles of an international land border with Canada or Mexico; the South Arterial is not.
2. Projects must be on the federally designated National Highway System. The South Arterial is not an existing road and could only be considered for NHS designation by FHWA if there's a complete funding package to build the route within six years of designation, and it is determined that the route is an eligible NHS route.

The eligible federal funding sources are discussed below:

- **Congestion Mitigation and Air Quality Improvement Program (CMAQ)**
  CMAQ funds are federally apportioned to Montana and allocated to various eligible programs by federal formula and the Transportation Commission. These funds pay for transportation projects that improve air quality in "non-attainment" and "maintenance" areas, those areas where the Environmental Protection Agency (EPA) considers air quality to be poor, or where there have been air quality problems in the past. Eligible activities include transit improvements, traffic signal synchronization, bike/pedestrian projects, intersection improvements, travel demand management strategies, traffic flow improvements, and public fleet conversions to cleaner fuels. At the project level, the use of CMAQ funds is not constrained to a particular system (i.e., Primary, Urban, and NHS). Of the total received, 86.58 percent is federal and 13.42 percent is non-federal match. A requirement for the use of these funds is the estimation of the reduction in pollutants resulting from implementing the program or project. These estimates are reported yearly to the Federal Highway Administration (FHWA).

  Although a certain portion of CMAQ funds must be directed to Missoula—Montana's only moderate carbon monoxide (CO) nonattainment area—the Transportation Commission also provides funds from this source for other programs, including the Montana Air and Congestion Initiative (MACI) program.

  Montana Air & Congestion Initiative (MACI) Guaranteed Funds - This is a state program funded with flexible CMAQ funds that the Commission allocates annually to Billings and Great Falls to address carbon monoxide issues in these CO "limited maintenance" areas. The air quality in these cities is roughly equivalent to Missoula; however, since these cities are "not classified," they do not get direct funding through the federal formula. The Great Falls MPO is allocated approximately $1,200,000 annually through this funding source.

- **Transportation and Community and System Preservation Program (TCSP)**
  The TCSP provides funding to states, local governments, and MPOs for discretionary grants to plan and implement strategies that improve the efficiency of the transportation system, reduce environmental impacts of transportation, reduce the need for costly future public infrastructure investments by ensuring efficient access to jobs, services, and centers of trade, and to examine private-sector development patterns and investments that support these goals.

  Most recently, USDOT and FHWA have directed these federal discretionary program funds to projects that are consistent with the federal Congestion Initiative to fight traffic gridlock. Therefore, recent years have seen funding directed to large urbanized communities in a limited number of urban-type states. If this trend continues, it may be difficult for Montana communities to compete for these types of funds.

- **Congressional Appropriations**
  These funds, also referred to as "earmarks," are appropriated by Congress for the specific use of a project. The $4,500,000 earmark authorized through SAFETEA-LU for the South Arterial came from this source. However, future earmarked funds are not assured, and there is a January 28, 2008, Executive Order by the President pledging to veto any appropriations bill from Congress that does not cut the number and cost of earmarks in half.

10.2.2. State Funding

The *2004 Great Falls Arterial Feasibility Study* discussed the possible use of state revenues for the project. Potential state funding sources are listed in Table 13.

Table 17. Potential State Funding Sources Identified in the *2004 Great Falls Arterial Feasibility Study*

State Sources	Description
State Fuel Tax	Per MCA 15-17-101, cities, towns, and counties are allocated a portion of state fuel-tax funds based on formulas provided through state statute. All fuel-tax funds allocated to city and county governments must be used for the construction, reconstruction, maintenance, and repair of rural roads or city streets and alleys.
State Sales Tax	Although Montana does not have a statewide sales tax, establishment of such a tax could provide a valuable source of additional funding for public improvements.

10.2.3. Local Funding

The *2004 Great Falls Arterial Feasibility Study* also discussed the possible use of a range of local revenues for the project. Potential local funding sources are listed in Table 14.

Table 18. Potential Local Funding Sources Identified in the *2004 Great Falls Arterial Feasibility Study*

Local Sources	Description
City and/or County General Fund	Includes property taxes, development fees, and other sources of general fund revenue
Local Fees	Includes impact fees, permits, motor vehicle license fees, and other fees
Local Option Taxes	Under state law, local option taxes must be imposed on a jurisdiction-wide basis and approved by a local referendum (the local option vehicle tax does not require voter approval). Montana law currently authorizes three local option taxes that can be imposed at the local level including a gas tax (not to exceed two cents per gallon), motor vehicle tax (0.7 percent), and resort tax. No county has successfully imposed the gas tax; several counties have imposed a vehicle class, while only a handful of cities have a resort tax.
Bonded Debt	A general-obligation bond could be passed to offset some project costs or used for a required local funding match. Some Montana communities have successfully issued this type of bond for transportation improvements.

Although not identified in the *2004 Great Falls Arterial Feasibility Study*, another local-funding mechanism is improvement districts. State law provides authority for counties to create Rural Improvement Districts, Road Improvement Districts, and Local Improvement Districts. Cities have statutory authority to create Special Improvement Districts.

10.2.4. Other Funding Sources

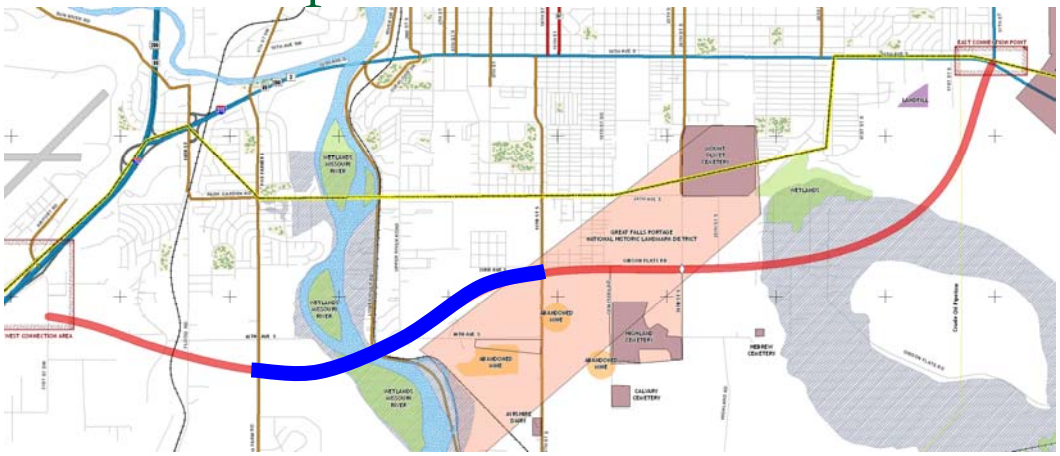
Additional funding could be realized through cost-sharing programs designed to make use of developer construction and contributions along the arterial corridor. Also, private donations of money and/or right-of-way could help to offset the cost of development and construction.

10.3 Estimated Costs

Based on most recently available unit costs, the recommended alignment for the South Arterial is estimated to cost in 2035 from approximately $208,000,000 (two-lane) to $285,000,000 (four-lane). A shorter segment of the arterial that could demonstrate independent utility with logical termini includes the segment from Fox Farm Road to 13th Street South (Figure 11), estimated to cost from $83,000,000 to $93,000,000 for a four-lane in 2017.

Figure 11 – Phased Implementation

Phased Implementation



- Initial Phase from Fox Farm Road to 13th Street South
  - Shortest segment with “independent utility” and “logical termini”
  - Shorter segment in this area would be difficult to construct

11. CONCLUSION AND NEXT STEPS

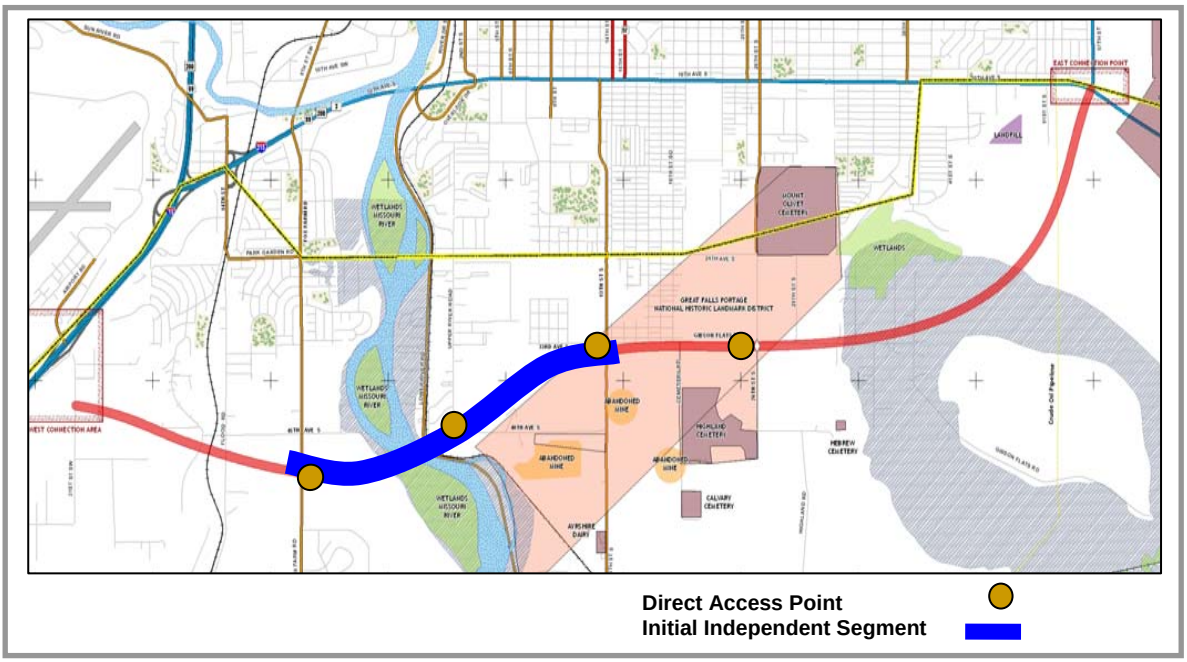
The analysis from the *Great Falls Arterial Feasibility Study* recommended a four-lane arterial serve as the basis for future studies. Both two-lane and four-lane arterial configurations were examined during this Alignment Study. As a result of this analysis the study recommends the Red Alignment (Figure 12) as the recommended alignment and that it be designed as a limited access, undivided, four-lane rural principal arterial with at-grade intersections and a 60 mph design speed. Based on 2035 travel demand, a four-lane is needed from I-15 to 13th Street South. However, east of 13th Street South a two-lane can accommodate future travel demand through the 2035 horizon but local governments should preserve the corridor for an eventual four-lane. The arterial should have direct access from Fox Farm Road, Upper River Road, and 13th Street South. At 13th Street South, it would utilize existing 33rd Avenue South/Gibson Flats Road with direct access at 26th Street South. From 33rd Avenue South/Gibson Flats Road, it would head towards its termination on 10th Avenue South (US 87/89). End points would be at I-15, near Gore Hill Interchange, and 10th Avenue South (US 87/89), near 57th Street South.

Given federal planning requirements and the substantial project costs, the ability to advance the South Arterial will be highly dependent on successfully financing and constructing independent segments of the arterial, as reasonably available funding sources are secured.

If the Fox Farm Road to 13th Street South segment was pursued as the initial independent segment, the estimated cost by phase in 2017 dollars would be:

Preliminary Engineering	$ 5,000,000
Right-of-Way	$14,000,000 – $17,000,000
Incidental Construction	$10,000,000
Construction	$51,000,000 – $58,000,000
Construction Engineering	$ 3,000,000
TOTAL	$83,000,000–$93,000,000

Figure 12 – Recommended Alignment and Segment of Independent Utility



Considering the amount of currently available funding (approximately $4,900,000 of the SAFETEA-LU earmark, plus state match remain), there are sufficient funds for development of an environmental document, which is part of the preliminary engineering phase. However, in order to achieve federal approval of the environmental decision document and ensure continued development of the South Arterial, it is critical that the participating agencies continue to work together to secure the remainder of the financing package to[10]:

- Demonstrate reasonably available revenues to cover the estimated cost of the initial independent segment from Fox Farm Road to 13th Street South and reflect funding for this segment in the update of the *2003 Great Falls Area Transportation Plan,* and
- Identify available funding for a subsequent phase (i.e., Final Design[11]) and update the Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) and MDT Statewide Transportation Improvement Program (STIP) to include funding for this project phase.

Additional critical steps in the financing package are:

- Update of the *2003 Great Falls Area Transportation Plan* - This plan update should include improvements as needed to other network links that would experience increased pressure with construction of the south arterial or partial arterial (i.e. 13th Street South, Upper River Road, 33rd Avenue/Gibson Flat Road, Flood Road, etc). In addition to item one above:
- Local governments should take appropriate steps to preserve the recommended South Arterial corridor, as lands are developed and as other opportunities arise.

[10] These steps are necessary if the environmental document identifies a preferred alternative other than the "No-Build".

[11] Currently, project phases are as follows: Preliminary Engineering (PE), Right-of-Way (RW), Incidental Construction (IC), Construction (CN), and Construction Engineering (CE). Recognizing "final design" as a project phase would require an MDT business process change allowing a two-tier approach to PE. The first tier being through the scope of work and the second tier being final design.